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FAMILY SPASTIC PARALYSIS OF SPINAL TYPE ON A HEREDOSYPHILITIC BASIS

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It is only recently that clinical histories have been published concerning patients suffering from heredosyphilis who have developed a syndrome identical to spinal spastic paralysis. Such cases are comparatively rare. Nonne,[1] in the last edition of his book, was able to report only about ten cases, including his own private ones. I have therefore thought it opportune to report the clinical histories of three such cases, occurring in two brothers and a sister, the offspring of a syphilitic father.

REPORT OF CASES

CASE 1.—*History.*—G. V., aged 54, a tradesman, at the age of 22 suffered from what was diagnosed as soft chancres of the penis. Married soon after, his first-born, a son, remained in good health. At intervals of two years a second son, a daughter and a third son were born. The fifth child, 14 years old, seemed slightly deficient, but was free from the syndrome of the three cases reported. The mother died four months ago from cardiopathic disease.

At the age of 46, the father began to complain of sexual impotence and involuntary urination. Lancinating pains in the lower extremities, a sense of oppression in the chest, incomplete emptying of the bladder, crises of dry cough with spasmodic dyspnea had only recently been complained of. He also complained of loss of memory.

Examination.—(November, 1920). Examination revealed: no motor or sensory disturbance of any of the cranial nerves; slight hypotonia of all four extremities; inequality of patellar and tendo Achillis' reflexes, both being weaker on the right side; normal upper extremity reflexes; the corneae were glistening, pupils punctiform, not reacting to light and reacting sluggishly to accommodation. There was hypalgesia along the ulnar surfaces of the forearms. There was no tenderness over the nerve trunks or grooves. Girdle hypalgesia was more marked on the right side, extending from the fourth intercostal space to the umbilicus. The Romberg sign was present. There was appreciable disturbance of locomotion. Specific senses were normal. The lymphatic glands on the right side of the neck were enlarged. The heart had a marked dilatation of the right ventricle with an aortic diastolic souffle; arteriosclerosis was present. The blood Wassermann test was positive. Lumbar puncture was refused by the patient.

1. Nonne: Syphilis und Nervensystem, Ed. 3, Berlin, 1917.

Case 2.—*History.*—This patient was the second son of G. V. He had retarded intelligence from infancy, but no definite syndrome developed until he was 16 years old, when he gradually began to complain of a slight amblyopia of the right eye which progressed to almost complete amaurosis within three years. While blindness was coming on in his right eye, amblyopia of the left eye gradually supervened, progressing to blindness in about two years. A concomitant slow and progressive weakness of the lower extremities was noted, with sensations of constriction in the limbs. He was, however, able to walk without assistance.

Examination.—There were no disturbances of the cranial nerves, with the exception of the optic nerve. Active and passive movements of the neck and upper extremities were normal; speech was normal. Muscular nutrition of the lower extremities was normal; passive movements met some resistance; active movements were correctly carried out, though sluggishly. In the act of walking the feet were only slightly raised and the knees slightly flexed (paretic-spastic gait). The tendon reflexes of the lower extremities were all active; there was no Babinski sign. The pupils were equal and sluggish to light. Sensory reactions and specific senses were normal. Right Eye: There was a soft complete cataract of this eye; the fundus could not be explored; light perception was normal at 3 meters. Left Eye: There was an incomplete soft cataract of this eye, also; the fundus showed atrophy of the optic nerve (post-neuritic); several areas of chorioretinitis in the periphery.

Case 3.—*History.*—A daughter of G. V., aged 22 (third born), experienced no disturbances until 16 or 17 years of age when she began to notice a sense of weakness and constriction of the lower extremities which slowly progressed until she not only dragged her feet and barely flexed her knees, but was so weak that, after taking a few steps she had to sit down, requiring assistance in order to prevent her from falling. There had never been any vesical or rectal disturbances, but she suffered from severe ozena. She had not received treatment.

Examination.—The cerebral nerves were normal; speech was, however, halting in type (bradyarthria). The upper extremities were normal. The lower extremities showed resistance to passive movements; active movements were all slow and incomplete, especially those of the feet. In walking, the feet were only slightly raised and the knees slightly flexed; she stood mainly on the toes; the radial reflexes were absent; only the right epigastric reflex was present; both the abdominal and the left epigastric reflex were absent. Patellar and tendo Achillis' reflexes were active; the plantar reflex on the right side spread out in fan shape. The Babinski sign was absent. The pupils were of medium size with a tendency to myosis; they reacted slightly to light. There was normal sensibility of the specific senses and sphincters. The blood Wassermann reaction was +++. Mental deficiency was present; ideation was infantile; there was fairly well marked apathy even as regarded her vegetative functions. She did not evince any interest in her case. Memory was poor; perception was correct though rather limited to elementary demands.

Case 4.—*History.*—A son of G. V., aged 20 (fourth born), from childhood showed marked signs of deficiency. At 16 he began to develop weakness of the lower extremities with rigidity, progressive in type.

Examination.—The cranial nerves were normal as were also the upper extremities. There was diminished strength in the lower extremities with abnormal resistance to passive movements. Abdominal, patellar and tendo

Achillis' reflexes were greatly increased. There were no rectovesical disturbances and no appreciable changes of general sensibility or of specific senses. Blood and spinal fluid tests were refused by the patient. Mentally the same defects were found that were apparent in his sister, but more pronounced; retarded perception, poor memory, apathy, stubborness, and poor reasoning power.

Conclusions.—It is evident that the father was a tabetic patient; the history and clinical findings were typical. With the exception of the first-born, all of his children were more or less deficient; all three, at about the same age (at puberty) began to suffer from progressive motor disturbances of the lower extremities terminating in the syndrome of family spastic paralysis (spinal type). One of the brothers also suffered from optic atrophy, choroiditis and double cataract.

CASES IN THE LITERATURE

The following similar cases are reported in the literature, most of them in Nonne's book:[1]

Friedmann[2] reports the cases of two children, 10 and 15 years old, who had spastic spinal paralysis on a probable syphilitic base. In the first case there was complete recovery after two attacks, under antisyphilitic treatment; the second patient also had two attacks with complete recovery after the first one and only improvement after the second.

In Hoffmann's[3] case the mother had a history of syphilis. The boy developed spastic paralysis at 12 years of age with arrested mental and physical development. He had mydriasis, paresis of accommodation and pupillary rigidity.

Mendel[4] reported a case of spastic spinal paralysis on a syphilitic basis manifested at the age of 5, with progressive weakness and obtunded sensibility of the lower extremities. Slight ischiuria was also present.

Sachs[5] reported the case of a patient with a tabetic mother with a history of two abortions and the early death of three infants. The patient developed the spastic syndrome at the age of 5 with retrogressive mentality. In this case there was also found a spastic paresis of the upper extremities with pupillary disturbances one year later.

Luzenberger[6] found the syndrome in two brothers whose parents probably had suffered from syphilis.

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2. Friedmann: Ueber rezidivierende sogenannte spastische Spinalparalyse im Kindersalter, Deutsch. Ztschr. f. Nervenh. **2**: 1892.
3. Hoffmann: Neurol. Centralbl., No. 13, 1894.
4. Mendel: Quoted by Nonne.
5. Sachs: The Nervous Manifestations, Am. Med. Bull., 1896.
6. Luzenberger: Quoted by Nonne.

Vizioli [7] reported the cases of three brothers and a sister; the father was syphilitic. All four had chronic degenerative anomalies and Hutchinson's teeth. Only one could talk clearly; the others had disturbances of articulation. All four had normal births at term and appeared normal until they began to walk, when rigidity with the typical adduction and internal rotation of the lower limbs was noticed; it was also difficult for them to sit down. Spasticity of the upper extremities was less marked and there was also a certain degree of rigidity in the muscles of the face and neck and of deglutition. The reflexes increased variably. All manifested some degree of intellectuality.

Königstein [8] reported a case in which there was syphilis in both parents. The patient at the age of 9 showed slight mental defects, spastic paresis of all the extremities and rigid pupillary reflexes.

In one case reported by Nonne the mother had a chancre of the lip two years before her marriage. The son, when 10 months old, had a roseola and psoriasis plantaris, but otherwise developed normally until the age of 4, when disturbances of locomotion manifested themselves. Spastic gait, ankle clonus and the Babinski sign were present; pupils were normal; there was a slight grade of cranial rachitis.

Nonne also reports a case in which the father was syphilitic. The patient was sickly at birth. He began to walk at the age of 3 and from then on retrogressed mentally. Examination showed subnormal bodily development, stupid expression, left convergent strabismus, spastic paresis of the lower extremities, ankle clonus and a Babinski sign. There were rigid reflexes of the left eye, weak reflexes of the right eye with bilateral partial optic atrophy and multiple foci of choroiditis.

In a third case reported by Nonne the father was syphilitic. The child was born prematurely (7 months). It was weak and began to talk rather late. First dentition was also retarded. On account of the spastic paresis of the lower extremities, it never walked. The child looked like an imbecile. There was slight left convergent strabismus. The cranium was slightly microcephalic. The teeth were carious. Speech was normal. No sensory and sphincteric disturbances were found.

In a fourth case reported by Nonne the mother had given birth to four older children who had all died in infancy. The patient at 9 years of age had weakness and rigidity of the extremities; he was queer, bad tempered and avoided other children. The gait was

7. Vizioli: Quattro casi di diplegia spastica familiare infantile eredosifilitica, Ann. di Neurol. **12**: 1898.

8. Königstein: Ein Fall von luetischer Spinalparalyse und reflektorischer Pupillenstarre, Mitt. d. ges. inn. Med. u. Kinderh. **9**:246, 1910.

pareticospastic, slight foot clonus and a bilateral Babinski sign were present; the right pupil was rigid, the left reacted only to convergence. The patient suffered from general weakness and was somewhat imbecile. Wassermann reaction: blood +, spinal fluid +, globulin positive. In the mother the Wassermann reaction was pronounced.

Artigalas [9] reported the cases of three brothers all displaying spastic phenomena and muscular pseudohypertrophy. The syndrome gradually diminished under mercurial treatment.

Finizio [10] reported the cases of two children of syphilitic parents who began to show, at the age of 3, pareticospastic phenomena. One child also exhibited bradylalia, and the other deficiency of the extrinsic eye muscles.

Déjerine [11] reported the case of a child who at the age of 8 began to show locomotor disturbances which slowly resulted in contractures. The thighs and legs were extended, while plantar flexion coexisted. Mental development was retarded. The pupils were rigid and unequal. The spinal fluid showed a profuse lymphocytosis.

SUMMARY

The preceding cases allow me to form a clinical grouping of the syndrome observed in each case.

The first signs of the spastic spinal syndrome due to heredosyphilis may manifest themselves just as the child begins to walk; locomotion may begin normally or be retarded; in other cases the first signs appear after the child has learned to walk properly. Thus, Nonne's first case had its onset when the patient was 4 years of age, Mendel's at 5, Déjerine's at 8, Hoffmann's at 12 and mine at puberty.

The motor disturbances—spastic paresis—may be limited to the lower extremities, as in Nonne's second and third cases, in Mendel's case and in my cases; or they may extend to the upper extremities, as in Sachs', Vizioli's, Königstein's and in the first and fourth cases of Nonne. The paresis and spasms were sometimes uniform, rarely severe enough to prevent the patient from standing up (Nonne's second and third cases). The spasms have a gradual onset and sometimes attain a severe degree of rigidity; sometimes even extension contractures of the thighs and legs and plantar flexion of the feet have been present. In one case spasm of the muscles of the neck was found. Reports on the condition of the lower extremity reflexes are

9. Artigalas: Quoted by Sandri in La sifilide ereditaria del sistema nervoso, Milan, 1911.

10. Finizio: Quoted by O. Sandri in La sifilide ereditaria del sistema nervoso, Milan, 1911.

11. Déjerine: Paraplégie spasmodique de l'enfance, Soc. de Neurol. de Paris, 1904.

incomplete; generally speaking, they are exaggerated (my own cases). Foot clonus may be present (Cases 1, 2 and 4 of Nonne). The Babinski sign was seldom present. In many patients the pupils did not react to light (Déjerine, Hoffmann, Sachs, Königstein, and the fourth case of Nonne). Anisocoria is less frequent; in my cases, only the second son had this symptom, but he also had a bilateral cataract and optic atrophy, the latter condition being also a feature (unilaterally) in Nonne's second case. In two cases there were left convergent strabismus and weakness of the external ocular muscles (Finizio). General sensibility is usually well preserved. In one case, rectovesical disturbances were recorded, resembling Erb's syphilitic paralysis. Disturbances of articulation (bradyarthria) were noticed in a few cases.

Psychic disturbances were common, but none seemed to attain a severe degree. My own patients all manifested varying degrees of imbecility—deficient attention, poor ideation, weak reasoning power, apathy, etc. Some patients, notably Vizioli's, had a normal mentality. The Wassermann reaction was positive in my cases and in Nonne's fourth case; it was negative in the spinal fluid of Nonne's second patient. Syphilis was assumed as the result of specific therapy (Artigalas) or after examining the spinal fluid (Déjerine). Syphilis had undoubtedly infected either the mother (Hoffmann, Sachs, first and fourth cases of Nonne) or the father (Vizioli, fourth case of Nonne and my cases) or both parents (Luzenberger, Finizio). This does not mean that in any of these cases one of the parents was immune; it is likely that an important factor in the production of this disease is the lack of antisyphilitic treatment in the parents. In Hoffmann's case, the mother had had two abortions and one child who lived only fourteen days; in Sachs' case there had been two abortions and three children who died in infancy; in Nonne's fourth case the mother had lost four infants. In my cases, the children were born shortly after the father had acquired syphilis, for which he had taken no treatment. Many authors state that there were no degenerative or heredosyphilitic stigmas in their cases; Vizioli alone reports cranial anomalies and Hutchinson's teeth. Often the spinal spastic paralysis assumes the family type (Vizioli, Luzenberger, Finizio and my own cases). It is not unreasonable to suppose that many of the cases of family spastic paralysis, described at a period when syphilis was not carefully considered, are really due to heredosyphilis. In the cases of Tooth and Tambroni,[12] in which syphilis was not even mentioned as an etiologic factor, family spastic paralysis began in infancy or in the early juvenile

12. Tambroni: Sopra un caso di tabe spastica famigliare, Riv. sper. di freniat., 1897.

period; at present there are cases of this syndrome based on heredosyphilis (Luzenberger, Vizioli, Finizio and my cases).

It is hard to say under what conditions heredosyphilis will produce spinal spastic paralysis rather than some other type of cerebral or spinal disturbance. The syndrome, or to be more exact, the various disturbances more or less constantly associated with the dominant symptom of spastic paralysis, suggest the conception of a primary morbid process of the encephalon, particularly of certain cortical areas and of their associated fibers. In some cases it is difficult to separate these types from Little's syndrome, because the pareticospastic motor disturbances only appear after the child has begun to walk (Vizioli, Nonne's second, third and fourth cases). Nevertheless, even in the cases of late development, in which the first symptoms appeared at the ages of 4 or 5, or even at 12 to 14 years of age, it does not seem to me that one should deny a close similarity of the syndrome in question and that of the congenital spastic paralysis of Little. The fundamental pathology of Little's syndrome lies in a deficient development of the pyramidal tracts which, arrested in the cervical segment or in the dorsolumbar segment, produce, respectively, a spastic tetraplegia or a paraplegia. One can extend this conception (the possibility of Little's syndrome being the same as that of family spastic paralysis) and admit that in the late cases of the disease in question the pathogenic element (syphilitic poison) affects the extreme end of the corticospinal protoneurons, pyramidal neurons, which are already developed, in order to understand that this will lead to an early decay—apparently primary—of the distal portion of these neurons. But in order that this may occur, it is necessary to fall back on a postulate, that is, that the neurons arising from the cerebral cortex, and especially those forming the corticospinal bundles, are so delicate that slight disturbances may result in degeneration. One can thus understand why, owing to the precocious onset of the disease, there are to be found areas of degeneration or absence of other anatomic structures which were developed prior to the disease, such as the optic reflex tract, nuclei of the abducens and optic nerve fibers. This would explain why in a third of all cases the disease began at the same period of life, especially at the time of puberty when the loss of balance of the endocrine glands is so easily acquired. One finds the same parallel in other organic neuroses, namely, muscular pseudohypertrophy and spinocerebellar aplasia (morbus Friedreichi). One might object that in some cases of spinal spastic paralysis the mentality was almost normal, but it is known that even in pure types of Little's syndrome the mental symptoms may be slight. This harmonizes with the fact that aplasia of the Rolandic cortical cells is sufficient to produce Little's syndrome; on the other

hand, pupillary disturbances, convergent strabismus and congenital psychic arrest are met with rather frequently in this disease.

It is only the cases of Artigalas and of Friedmann, in which the patients were more or less permanently cured under specific treatment, that can be interpreted as the result of strictly medullary localization, caused by syphilitic and not parasyphilitic processes, as one must presume to be the case in all of the other patients.

I feel justified in making the foregoing statements because, instead of speaking (according to Nonne) of "spinal spastic paralysis with or without cerebral symptoms," I prefer to call the syndrome "spastic paralysis of spinal type." This follows the tendency of modern neuropathology of placing in the cerebrospinal class certain disturbances hitherto classed as purely spinal. This classification is, up to the present day, applied to tabes, amyotrophic lateral sclerosis and spinocerebellar aplasia (Friedreich and Pierre Marie); at present it should be applied also to the spastic-spinal syndromes on a heredosyphilitic basis.

THE PATHOGENESIS OF EPILEPSY FROM THE HISTORICAL STANDPOINT,

WITH A REPORT OF AN ORGANIC CASE *

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Epilepsy, or the sudden loss of consciousness accompanied by convulsions, has always fascinated and baffled the observer. That primitive man is intensely interested in the disease is evidenced by numerous and detailed hypotheses of etiology and by still more numerous therapeutic measures. The primitive mind in its anthropomorphic conception of the universe and its phenomena frequently confuses *post hoc* with *propter hoc*.

Not only in epilepsy, but "in any painful illness, especially when the sick man is tossing and shaking in fever, or writhing in convulsions on the ground, or when in delirium or delusion, he no longer thinks his own thoughts or speaks with his own voice, but with distorted features and strange unearthly tones breaks into wild raving, the explanation which naturally suggests itself is that another spirit has entered into or possessed him. Any one who watches the symptoms of a hysterical-epileptic patient, or a maniac, will see how naturally in the infancy of medical science demoniacal possession came to be the accepted theory of disease, and the exorcism or expulsion of these demons the ordinary method of treatment."[1]

Some primitive tribes hold that the evil spirits or demons, who enter a person and cause the epileptic phenomena, live ordinarily in animals (animal spirits) or that they may come from the realm beyond the natural. Other tribes think that the disease is due to temporary escape of the frightened soul from the body,[2] and when one observes an epileptic child with distorted features and outstretched hands issue a sudden cry as if frightened and fall unconscious to the ground, this primitive idea of a frightened soul escaping from the body does not

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* From the Laboratory of the Massachusetts State Psychiatric Institute, Boston.

1. Tylor, E. B.: Anthropology, New York, 1909, pp. 353 and 354.

2. Bartels, M.: Die Medizin der Naturvölker, Leipzig, 1893, pp. 15, 22, 23, 38, 42 and 213.

appear so absurd. "According to the Belqula or Bella Coola Indians of British Columbia the soul dwells in the nape of the neck and resembles a bird enclosed in an egg. If the shell breaks and the soul flies away, the man must die. If he swoons or becomes crazed, it is because his soul has flown away without breaking its shell.[3]"

But even more civilized people hold superstitious ideas about epilepsy. Thus in upper Bavaria it was formerly thought that epileptic persons were tortured by the spirit of some departed, greedy for a living soul.[4] It is notable that many primitive races assign natural causes to the disease. In the Celebes epilepsy is regarded as hereditary.

The older civilized races have penetrated into the probable etiology of epilepsy. Some of them, however, still hold to the idea of demoniacal possession. "Epilepsy, while not mentioned in the Old Testament, is often alluded to in the New. The Greek designation *Seleniazomenoi* (literally 'moonstruck') owes its origin to the idea that the disease was due to the moon. In the new Testament period this illness was attributed to demoniac possession though Matthew usually distinguishes between the possessed and the lunatic."[5] Here a new cause, a natural cause, is introduced, namely, the influence of the moon. That this celestial body exerts a pathogenic influence on the human constitution is held in certain districts of Latwija, known to my personal experience. The source of this idea is probably the Bible. It may be that the moon, especially the full moon, has a definite effect on certain neurotic persons, as has been recently shown by J. Sadger.[6]

The Hindus assign psychologic causes to epilepsy. "Epilepsy, Apasmara, literally forgetting, arises in the channels of the heart, especially by worry, anger, desire, fright, joy, and other emotional excitements, and manifests itself by contractions of eyebrows, mouth, clouding of consciousness, fainting, dizziness, sweating, flatulence, weakness, and other manifestations.[7]" It is significant that these mental factors have been recently reemphasized.[8]

But it was left to the Greek mind to tear down supernatural causes and point to the head (the brain) as the seat of the lesion causing

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3. Frasier, J. C.: The Golden Bough. A Study in Magic and Religion, Ed. 3; Taboo and the Perils of the Soul, New York, Macmillan Co., 1911, Pt. 2, p. 34.

4. Hofler, M.: Volksmedicin und Aberglaube in Oberbayerns Gegenwart und Vergangenheit, München, 1893.

5. The New Schaff-Herzog Encyclopedia of Religious Knowledge, New York **3**:447, 1909.

6. Sadger, J.: Ueber Nachtwandeln und Mondsucht. Eine Medizineschliterarische Studie, Wien, 1914, pp. 1-171.

7. Jolly, J.. Medicin. In "Grundriss der Indo-Arischen Philologie und Altertumskunde," Strassburg **3**: No. 10, p. 121, 1901.

8. Clark, L. P.: Clinical Studies in Epilepsy, Psychiat. Bull. **2**:21, 1917.

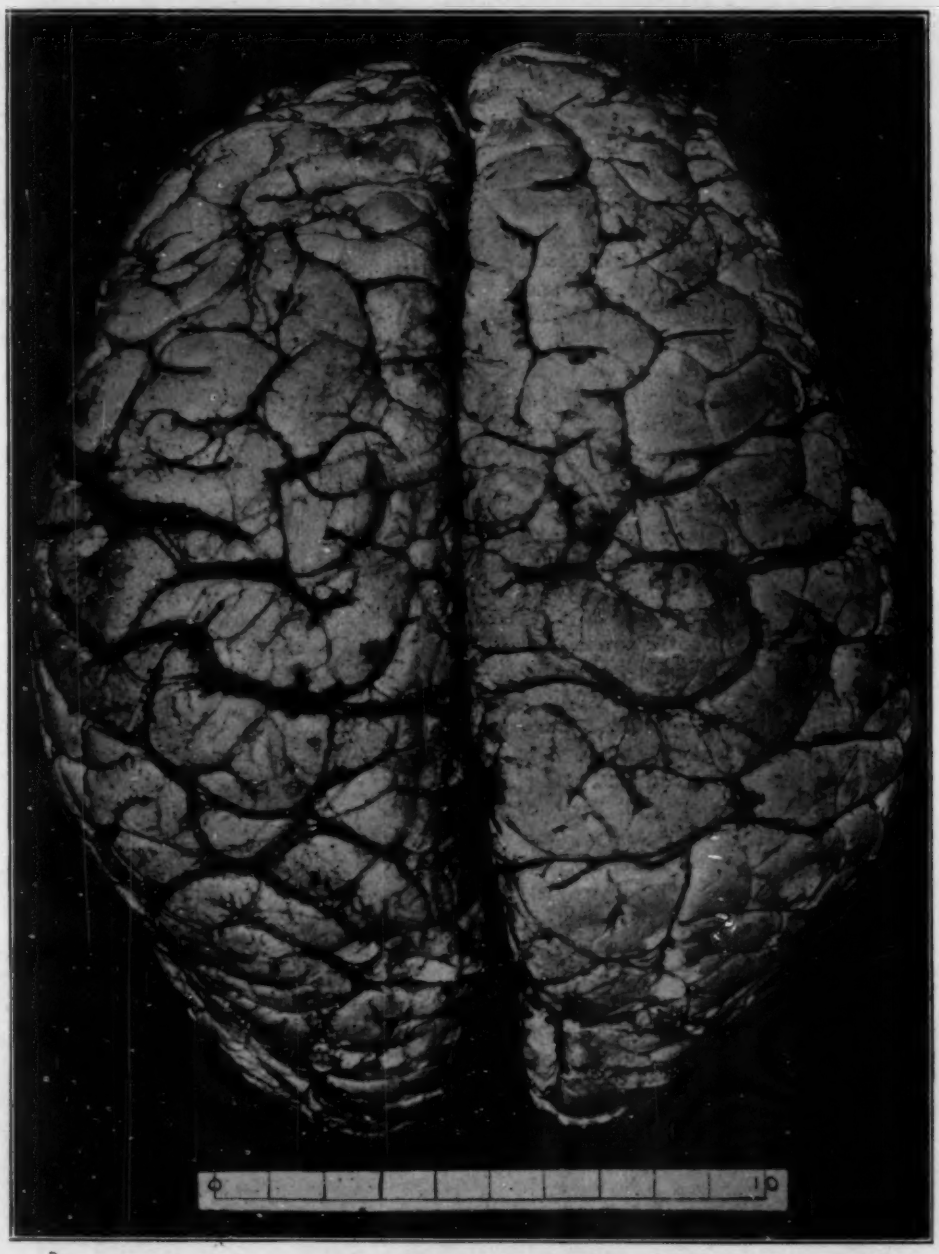

Fig. 1.—Superior surface of stripped brain; enlargement of left frontal lobe.

epilepsy. Here medicine became entirely separated from metaphysical speculation and philosophy. The clearest exposition of the etiology of epilepsy is that of Hippocrates:[9]

"For, if they (epileptic patients) imitate a goat, or grind their teeth, or if their right side be convulsed, they say that the mother of the gods (Cybele) is the cause. If they speak in a sharper, shriller tone, they liken this state to a horse and say that Poseidon is the cause . . . But if foam be emitted by the mouth and the patient kick with his feet, Ares (Mars) gets the blame. But terrors which happen during the night, and fevers, and delirium, and jumpings out of bed, and frightful apparitions, and fleeing away—all these they hold to be the plots of Hecate, and the invasions of the Heroes, and use purifications and incantations, and as it appears to me, make the divinity to be most wicked and impious." "Its origin is hereditary, like that of other diseases." ". . . the brain is the cause of this affection, as it is of other very great diseases, and in what manner and from what cause it is formed, I will now plainly declare." "If the secretion (melting) from the whole brain be greater than natural, the person, when he grows up, will have his head diseased, and full of noises, and will neither be able to endure sun nor cold." "Or, if the depuration do not take, but it (secretion?) accumulates in the brain, it necessarily becomes phlegmatic." "The man becomes speechless when the phlegm, suddenly descending into veins, shuts out the air, and does not admit it either to the brain or to the vena cava, or to the ventricles, but interrupts the inspiration." In other words, "when the veins are excluded from the air by the phlegm and do not receive it, man loses his speech and intellect, and the hands become powerless, and are contracted, the blood stopping and not being diffused as it was wont."

"All these symptoms he endures when the cold phlegm passes into the warm blood, for it congeals and stops the blood." "For the brain becomes more humid than natural, and is inundated with phlegm, so that the defluxions become more frequent, and the phlegm can no longer be excreted, nor the brain be dried up, but it becomes wet and humid. This you may ascertain in particular, from beasts of the flock which are seized with this disease, and more especially goats, for they are most frequently attacked with it. If you cut open the head, you will find the brain humid, full of sweat, and having a bad smell (hydatid). And in this way truly you may see that it is not God that injures the body, but disease, and so it is with man. For when the disease has prevailed for a length of time, it is no longer curable, as the brain is corroded by the phlegm, and melted, and what is melted down becomes water, and surrounds the brain externally, and overflows it; wherefore they are more frequently and readily seized with the disease."

In the Middle Ages the etiologic explanation of the Old and New Testaments was accepted. Epileptic persons were looked upon as possessed by the devil. Only the Byzantine and Arabian physicians upheld the Greek tradition in medicine. A detailed discussion of epilepsy is found in the works of Alexander of Tralles[10] (525-605 A.D.)

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9. Hippocrates: The Genuine Works of Hippocrates, Trans. from the Greek by Francis Adams, New York, **2**:338-339, 1886.

10. Von Tralles, Alexander: Ueber die Epilepsie in "Original-Text und Uebersetzung," vol. 2, edited by Puschmann, Wien, 1878, pp. 534-535.

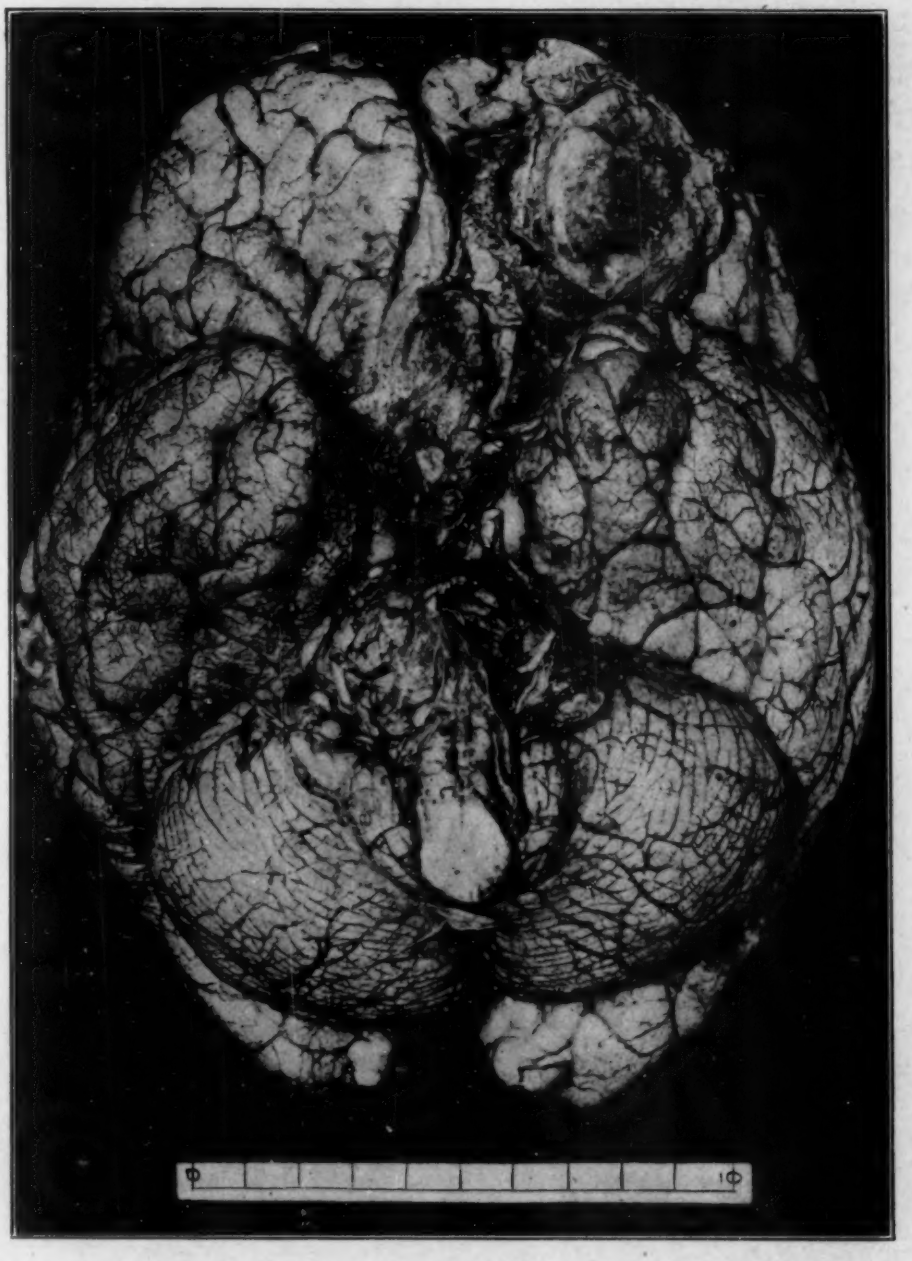

Fig. 2.—Basal surface of unstripped brain. The cerebellum fits closely about the medulla. The left frontal lobe shows an umbilicated tumor mass. The left olfactory lobe has been destroyed.

"The disease has its seat in the head, where the sensation and motion arise. That the head is the affected part is proven by the condition of the patient during the epileptic convulsion. They can not hear, see, or perceive in general, nor remember, but lie devoid of all sensation, and do not differ in anything from the dead; wherefore the disease is also called epilepsia, because the perception of the patient is extinguished and suppressed. Others call it the sacred disease, because the brain is regarded as something sacred and precious, while some call it the disease of Heracles, because it appears suddenly and is difficult to remove." "Epilepsy can arise in three different ways: It can have its origin directly from the head, or from the stomach, or from other parts of the body, and transplant the disease contained in them to the head."

Nothing of importance was added to the explanation of epilepsy until the nineteenth century, when Brown-Séquard experimentally produced epileptic convulsions in 1869-1870.[11]

But more important is the work of John Hughlings Jackson (1834-1911) [12] who described unilateral convulsions or focal epilepsy (1875) and originated the doctrine of levels in the central nervous system. This three-level doctrine and, in particular, its application to epilepsy, has been excellently discussed by Elmer E. Southard,[13] to whose article I refer those interested in the subject. The ideas of Jackson stimulated investigation of the pathogenesis of epilepsy. The muscles, the peripheral and sympathetic nervous system, and the bulbospinal apparatus were searched, but they threw comparatively little light on the mechanism of epilepsy. The same is true of the body at large and its fluids.[13]

"It is within the range of possibility that a kind of epilepsy might be produced by a poison acting directly on muscular substance (for convulsions) and on central nervous tissues (for unconsciousness). It is possible that twitchings in the death agony are so produced. But the march of convulsions in ordinary epilepsy suggests a higher origin." [13]

There is no doubt that epileptic convulsions, general as well as partial, arise at least mainly in the cerebral cortex, particularly in the electrically excitable areas.[14] "A paralyzing lesion destroying part of the motor is less likely to be followed by convulsion than one in the vicinity of the center, which slightly damages its structure and deranges its functions."[15]

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11. Livon, C. Cobaye: In C. Richet: Dictionaire de Physiologie, Paris **3**:926, 1898; Alford, S. B.: Brown-Séquard's Epilepsy in Guinea-Pigs, Boston M. & S. J. **165**:635-643, 1911.

12. Jackson, J. Hughlings: On the Evolution and Dissolution of the Nervous System, Lancet **1**:555-558, 649-652, 739-744, 1884.

13. Southard, E. E.: On the Mechanism of Gliosis in Acquired Epilepsy, Am. J. Insanity **64**:608, 610, 611, 1908.

14. Lewandowsky, M.: Die Funktionen des Zentralen Nervensystems, in "Handbuch der Neurologie: Allgemeine Neurologie" **1**: Pt. 2, 743-749.

15. Gowers, W. R.: Epilepsy and Other Chronic Convulsive Diseases, London, 1901, p. 160.

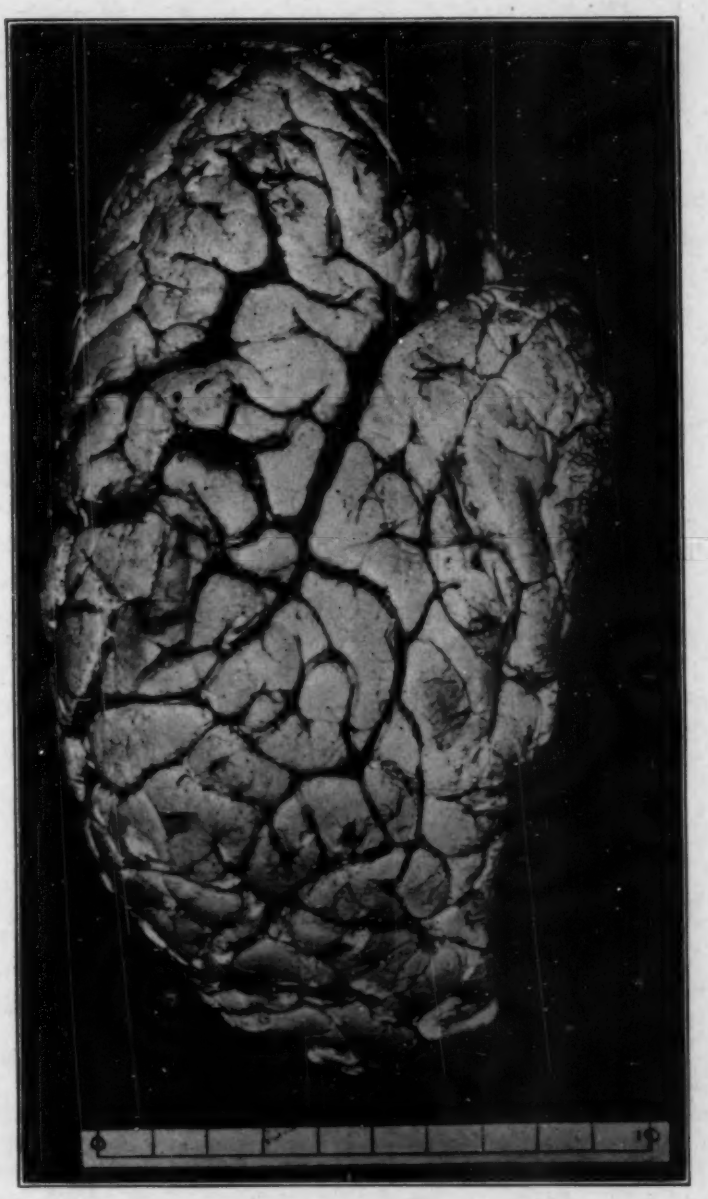


Fig. 3.—Right lateral surface of stripped cerebral hemisphere.

It is unnecessary to discusss all the organic conditions assigned to cause epilepsy. Brain tumors, however, form a rather interesting group. The following case in which the symptoms were those of idiopathic epilepsy, and in which necropsy examination revealed a frontal lobe tumor, belongs in this group.

History.—R. P., a woman, aged 44 years, a widow, a weaver, was admitted to the Monson State Hospital Nov. 11, 1913, at the age of 38 years. The patient stated that her epileptic attacks began four years ago. She thought that she had had two or three fits a week at the beginning but now she had a regular attack once a month "with little ones that don't amount to anything" in between. She was subject to the usual instability before the attacks and to a state of mental confusion following them. She appeared to be in a fair condition of health. No family history was obtainable.

She went to school until the age of 13 years. Several years later she went to work in a mill as a weaver, and married at the age of about 20. She had six children; two boys and two girls were living, one child was stillborn and another died in infancy. The eldest child was about 12 or 13; the patient did not know their whereabouts. Her husband died three or four years ago. She had measles in childhood. She had been alcoholic since youth, drank several bottles of beer and several drams of hard liquor every few days; became intoxicated once a week. Formerly she took snuff. She acknowledged that the last child was illegitimate. Menstruation was regular. She denied venereal disease.

Epileptic convulsions began four years ago. She had had seizures of both the grand and petit mal type. The aurae were sometimes gastric and at other times she had a sensation of dizziness.

Physical Examination on Admission.—This revealed nothing of importance.

Mental Examination.—Her memory both for recent and past events was poor. She was correctly orientated for time, place and person. Insight was good. She realized that her last child was illegitimate and expressed shame; she freely acknowledged that she used alcohol and considered this the cause of her epilepsy. She declared with all earnestness that she would never drink any more and felt that she could withstand any temptation.

During her stay in the hospital the patient had spells in series, usually at night, occurring about the time of her menstrual period; these were grand mal attacks with a few petit mal attacks and were followed by severe headaches and superficial soreness of the scalp. Nose and throat treatment, electric baths and sodium bromid did not result in any lasting beneficial effect. During attacks the patient occasionally injured herself. During the summer of 1917 the patient began to show progressive mental deterioration which by January, 1919, had become marked. The attacks became more frequent during January and February. The patient died Feb. 26, 1919, in the afternoon, following an attack in the morning.

Necropsy Examination.—Twenty-two hours postmortem. Only the essential findings of a very detailed examination were reported. Body that of a fairly well built, well developed and well nourished white female. Uterus retroposed. Cystic organ of Rosenmueller on right. Left Fallopian tube injected. Right lung has rudimentary middle lobe. Abdominal and pelvic viscera were negative. Head: The inner surface of the calvarium showed elevations and depressions and was unusually dry. The dura was tightly stretched over the brain

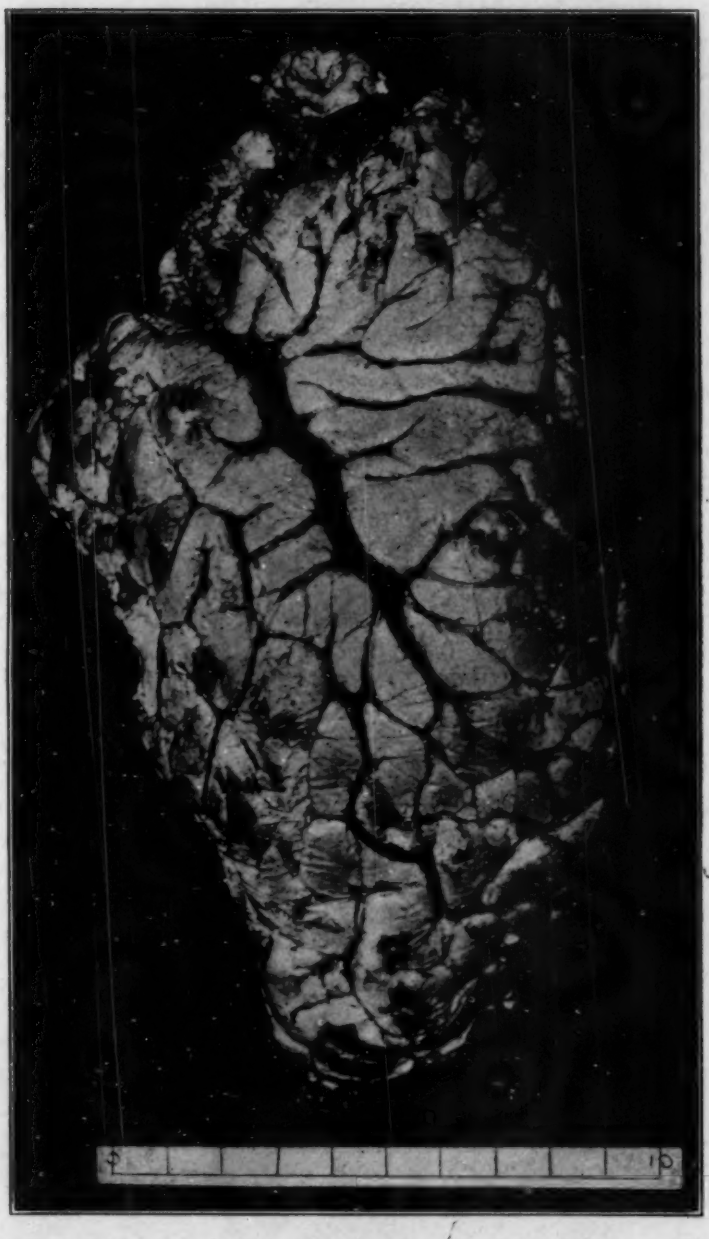


Fig. 4.—Left lateral surface of stripped cerebral hemispheres. Distortion and partial destruction of the frontal pole.

and convolutions could be seen through it. Over the midfrontal region fluctuation was palpated. The frontal lobe was adherent to the orbital plate of the frontal bone. The base of the brain showed an umbilicated, yellowish gray body, measuring 3.8 cm. in diameter in the left frontal lobe. The edges were granular and it was surrounded by gelatinous and softened brain tissue. The left olfactory bulb was destroyed by this growth. The tips of the lobus pyriformis were markedly lipped, especially on the left. The middle cerebral arteries were more sclerosed than the basilar. The temporal poles were uneven, the left being larger. Abruptly at the Sylvian fissure the brain tissue was soft and thin. Fluid withdrawn from the free edge of the body was yellow. Fluid from the third ventricle was clear. The superior surface of the brain was dry and glossy, with here and there a diffused blood content in the veins and a pressed out appearance of the veins. The medulla and pons were broad. The cerebellum fitted closely about the medulla. The orbital surface of the left frontal bone was elevated in a circular manner and to this surface the brain substance and portions of growth were attached. The bone itself in the central portion was eroded, giving this part of the bone a "Tam o' Shanter" appearance. The left optic disk showed some edema; the right was choked. The brain weighed 1,520 gms. Tigge's formula 8 x 152: 1216. The gain was 304 gm. The pituitary gland was soft, especially the posterior lobe.

Cause of Death.—Hydrocephalus was the cause of death.

Microscopic Diagnosis.—Psammoma in the left frontal lobe was diagnosed microscopically.

Cerebrospinal Fluid.—Cerebrospinal fluid findings were: cells, 36 (small lymphocytes 27, endothelial 2, polymorphonuclear 7); globulin +++; albumin +++; colloidal gold curve 0044553322; Wassermann reaction, unsatisfactory.

PSYCHIC DISTURBANCES CAUSED BY CEREBRAL TUMORS

Statistical compilations show that patients with cerebral tumors exhibit psychic disturbances in at least two thirds of the cases. This depends on the character and location of the tumor: bulb, one-fourth; cerebellum, one-third; hypophysis, two thirds; corpus callosum, all without exception (Bechterow,[16] Dercum [17]).

Among these psychic disturbances fits of unconsciousness with convulsions are frequent in cerebral tumors apart from cortical epilepsy, the presence of which depends on the definite location of the tumor. Attacks of genuine epilepsy, which may manifest itself at any stage of the disease, may be the precursor."[18] "In rare cases, general epileptic convulsions may for a long time be the only symptom produced by an intracranial tumor."[19] It may be impossible to distinguish them

16. Bechterew, W.: Troubles psychique dans les maladies nerveuses organiques, in "Traité international de psychologie pathologique," edited by A. Marie, Paris **2**:78-154, 1911.

17. Dercum, F. X.: A Clinical Manual of Mental Diseases, Ed. 2, 1917, p. 315.

18. Oppenheim, J.: Lehrbuch der Nervenkrankheiten, Ed. 6, Berlin **2**:1166, 1913.

19. Bramwell, B.. Intracranial Tumors, in Allbutt and Rolleston: System of Medicine, London **8**:226-290, 1911.

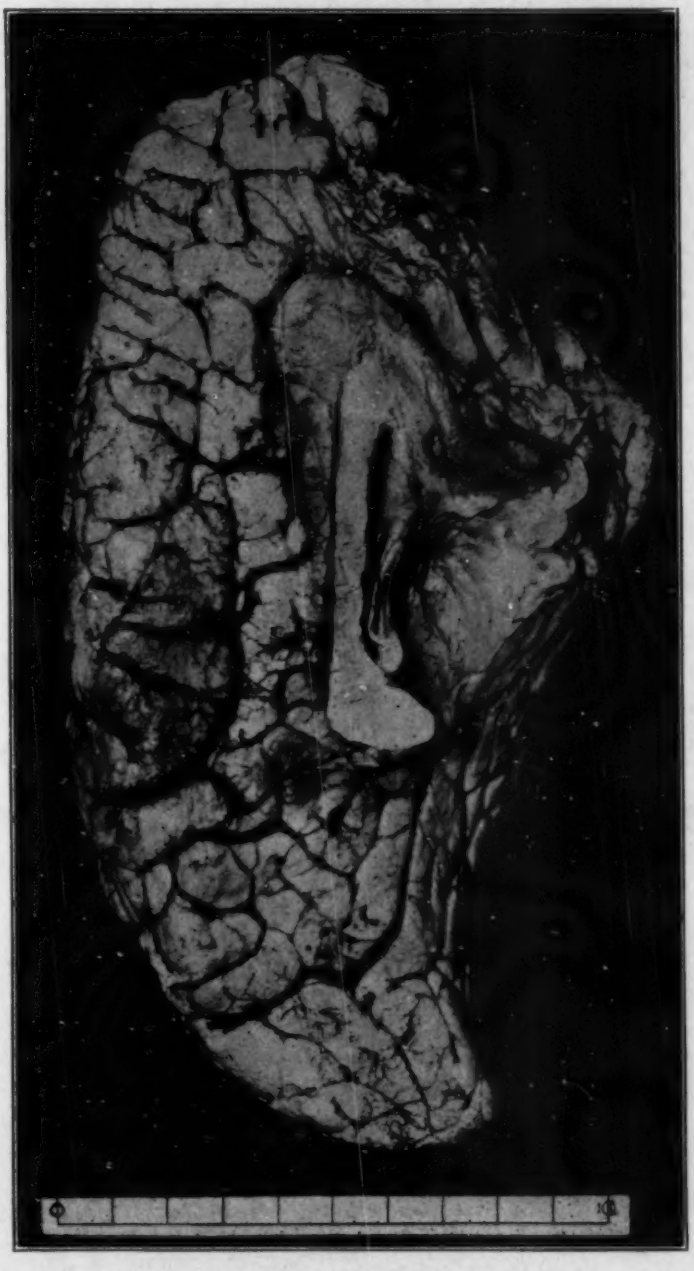
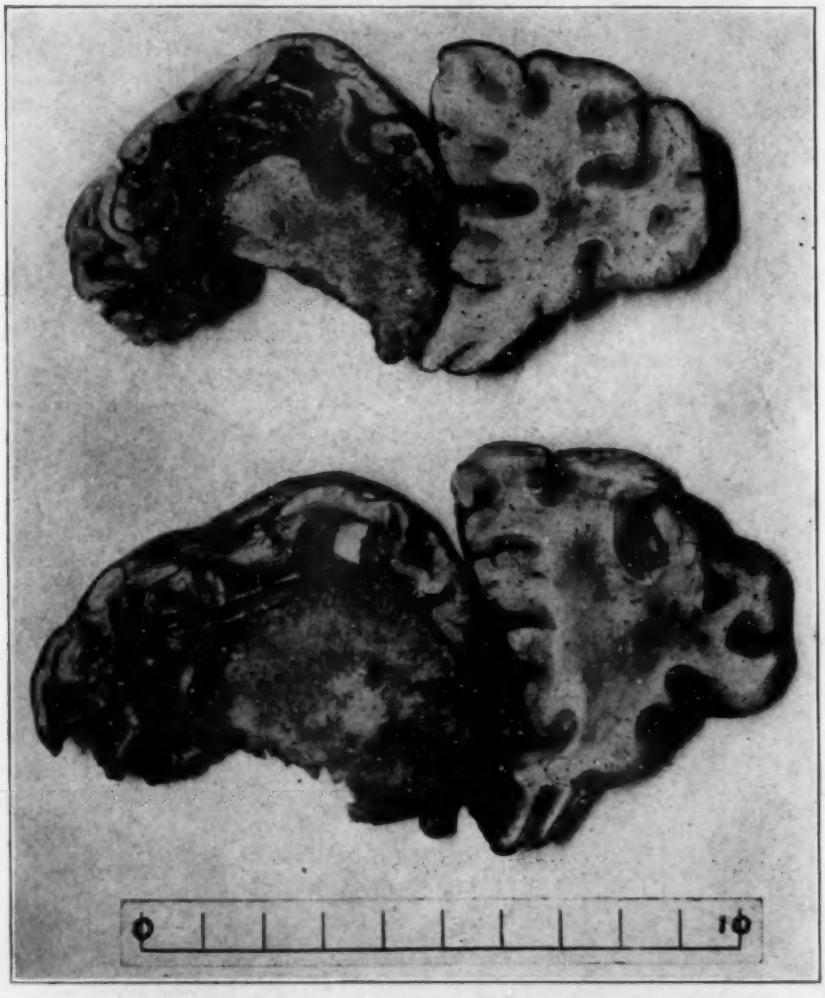


Fig. 5.—Mesial surface of stripped left cerebral hemisphere. The frontal lobe has been distorted and partially destroyed.

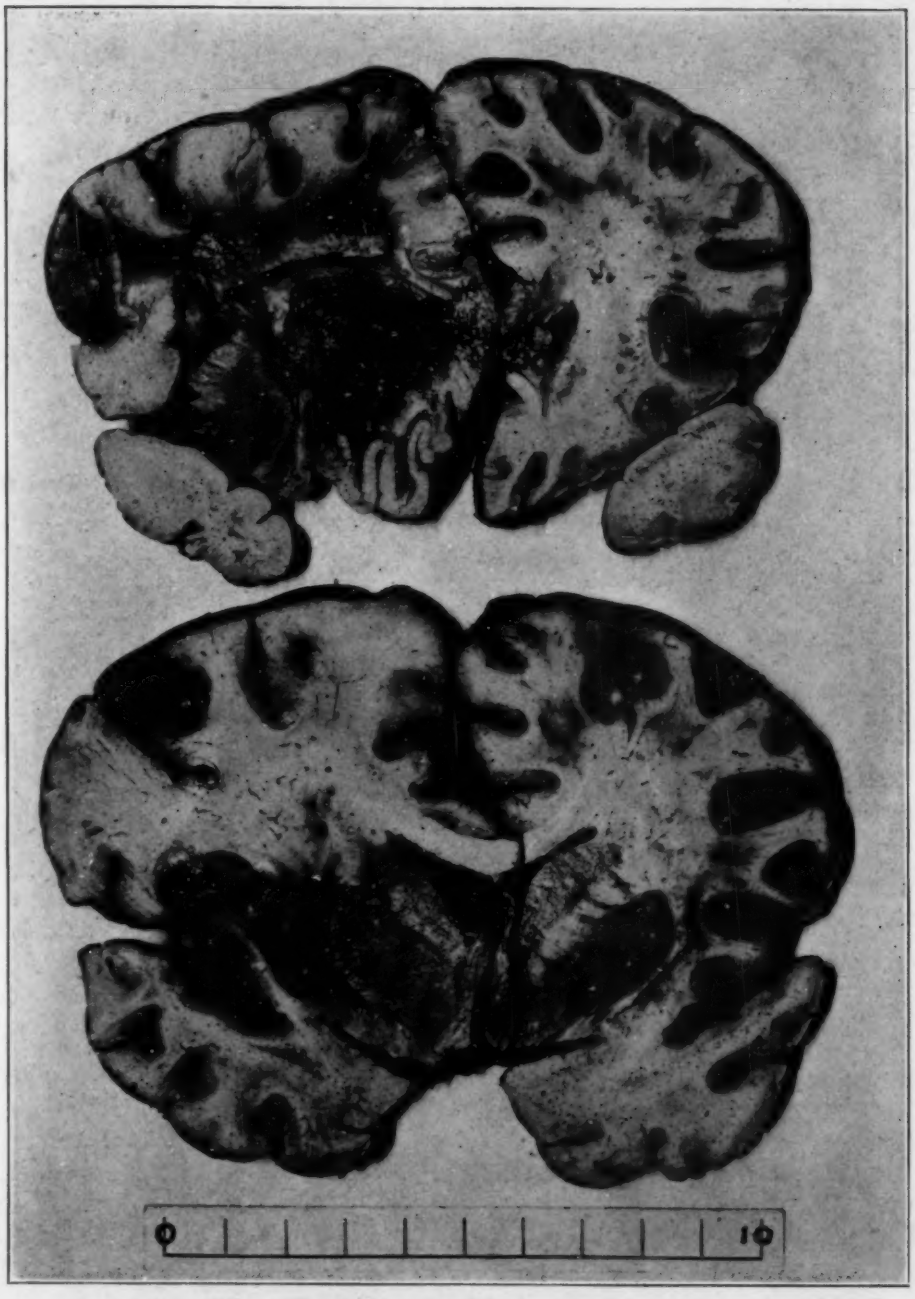
from ordinary idiopathic epilepsy until double optic neuritis, headache or other signs appear.[19] But it is doubtful whether epilepsy may be regarded as the first symptom, since often one may assume that a brain so organized is especially suitable soil for neoplasm.[18]



Figs. 6 and 7.—Frontal sections through the frontal lobes showing the tumor; marked tissue destruction of the left lobe.

With the possible exception of tumors in the corpus callosum, frontal lobe tumors show psychic disturbances more frequently than others (Schuster,[20] Duret, [21] Bechterew,[16] Dercum [17]). But mental

20. Schuster, P.: Psychische Störungen bei Hirntumoren, Stuttgart, 1902,



Figs. 8 and 9.—Frontal sections showing the psammoma. There is considerable distortion of the left hemisphere and encroachment on the right.

symptoms, regarded by some as characteristic of frontal tumor, are also seen, though less frequently, in tumors elsewhere. Negative cases, as regards mental symptoms, are observed even in bilateral frontal lesions.[2] There is no doubt that in the animal kingdom intellectual capacity runs parallel with development of the frontal lobes. However, the well developed frontal lobe is not characteristic of primates alone. Ungulates show well developed frontal lobes which relatively are hardly smaller than that of primates. Monakow's measurements in horses, cattle and goats show the frontal lobes to be 25 per cent. of

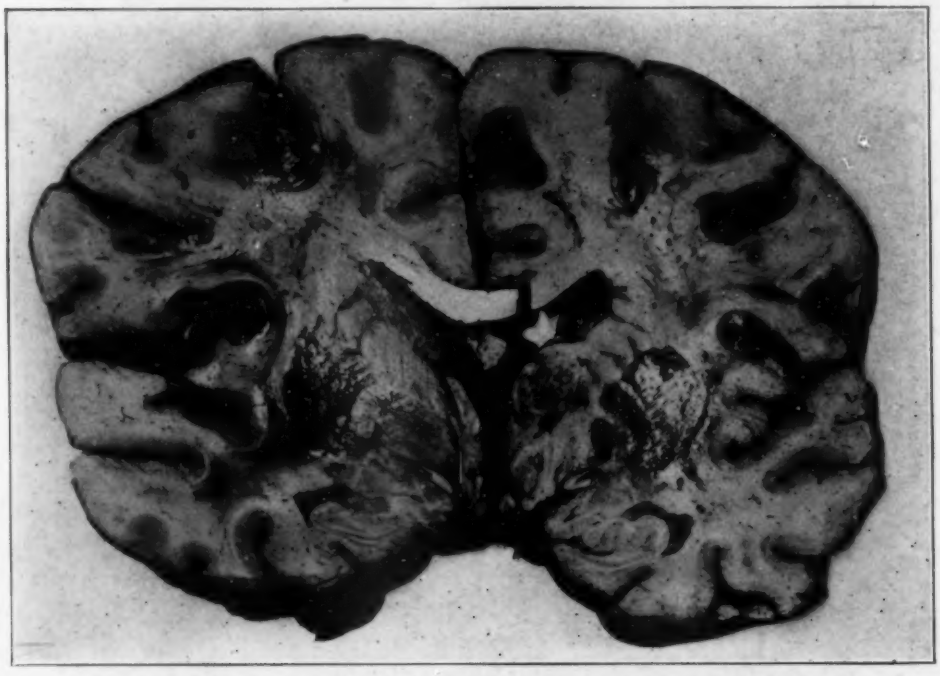


Fig. 10.—Frontal section passing through the thalami. This still shows the effects of the tumor.

the total brain volume; besides the lobe does not taper by any means. Further, this frontal cortex shows quite a number of well-formed convolutions. Despite all this there is no definite mental superiority of the ungulates over the carnivora. The well developed frontal lobe in ungulates is probably a counterbalance to the poorly developed regio sigmoidea (cortical representation of the extremities [22]).

But even in animals as high as the monkeys the function of the frontal lobes cannot be considered as definitely established. Horsley

22. Monakow, C.: Die Lokalisation im Grosshirn, Wiesbaden, 1914, pp. 883-885.

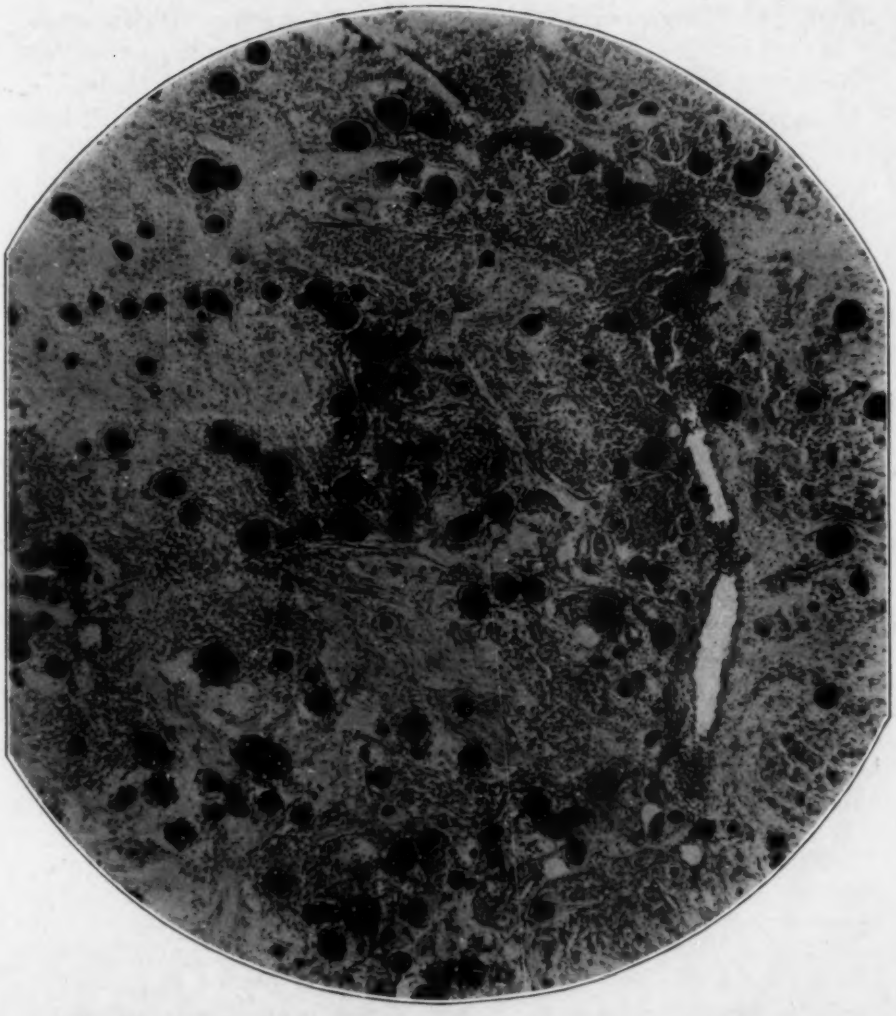


Fig. 11.—Microscopic section of the tumor, psammoma, showing numerous whorls composed of large flat cells arranged concentrically. In some whorls calcium is deposited and forms concretions.

and Schäfer [23] report an experiment on a monkey which, following extirpation of both frontal lobes, was kept alive for almost three months; during this period the animal showed no disturbance of the intellect. Later Graham Brown and Sherrington [24] showed that in a chimpanzee destruction of the motor cortex does not cause permanent paralysis. In their experiment the left arm center was removed with resulting paralysis on the right. Complete recovery took place in four and a half months. Regeneration of the area was excluded by the fact that six and a half months after the first operation the arm cortex was electrically inexcitable. The taking over of the movements by the postcentral electrically inexcitable convolution was excluded by removing this convolution two months after the second operation (Brown and Sherrington,[24] Bayliss [25]).

In spite of all this somewhat baffling experimental work on the frontal cortex, the frontal lobes may be looked upon as exerting a "psychoregulatory function.[26]" In the left cerebral hemisphere the motor centers predominate over the right, while the sensory cortex is better developed in the right hemisphere in right-handed persons. These functional differences are only quantitative, but in regard to higher psychic functions, they are qualitative.[26]

The mental disturbances of frontal lobe tumors are "comparable to symptoms of paresis: indifference, unpunctuality, mental enfeeblement, loss of memory and power of attention, change in disposition with more or less marked irritability or taciturnity or obstinacy or jocularity, etc., rambling speech, lack of realization of illness, change in general conduct of life, habits of untidiness."[27]

The general symptoms of intracranial tumors are produced mainly by retention and increased tension of the cerebrospinal fluid.[28] Anatomically the effects of pressure are seen in cerebral anemia, distur-

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23. Horsley, V., and Schäfer, E. A.: A Record of Experiment Upon the Functions of the Cerebral Cortex, Philosoph. Trans., 1888, p. 179 (cited by Monakow, p. 888).

24. Brown, T. G., and Sherrington, C. S.: Note on the Functions of the Cortex Cerebri, Proc. Physiol. Soc., J. Physiol. **46**:22, 1913; Brown, T. G.: Studies in the Physiology of the Nervous System, Quart. J. Exper. Physiol. **10**:103-143, 1916; Sherrington, C. S.: Stimulation of the Motor Cortex in a Monkey Subject to Epileptiform Seizures, Brain **41**: Pt. 1, 48, 1918.

25. Bayliss, W. M.: Principles of Physiology, Ed. 2, London, 1918, p. 480.

26. Bechterew, W.: Die Funktionen der Nervenzentra, Jena **3**:2010, 1911.

27. Cushing, Harvey: Tumors of the Brain and Meninges, in Osler and McCrae: Modern Medicine, Ed. 2 **5**:308-350, 1915.

28. Bruns, L.: Die Geschwülste des Nervensystems, Ed. 2, Berlin, 1908, p. 73.

bances of lymph circulation, edema and other diffuse histologic injuries of the cerebral cortex (degeneration of ganglion cells with increased satellitosis, disappearance of longitudinal fibers, etc.), and meningeal changes.[29] Meynert [30] speaks of a "functional choking of cortical function (Leistungen) running parallel with the mechanical pressure," while Dupré [31] emphasizes the toxic besides the mechanical factors in the symptomatology of cerebral tumor.

Kraepelin [32] thinks that psychic disturbances in tumors of the hemispheres are due to destruction of brain substance, to pressure impairing cerebral circulation and possibly to traction and displacement of the tissue with accompanying injuries. Further, one may under certain conditions consider absorption of decomposition products. Finally, as pointed out by Redlich,[29] in brain tumors one has to deal with the possibility that besides the new growths there are finer changes in other regions of the brain which may easily be overlooked.

But all these findings, even the most recent ones, such as gliosis and similar changes in the cerebral cortex of epileptic patients, add little to the understanding of the disease. They only point to organic changes underlyig epilepsy.[33] In the present state of our knowledge it is impossible to postulate an anatomic epilepsy,[34] since there are no changes in the central nervous system pathognomonic of epilepsy (Voisin,[35] Tramer [36]).

SUMMARY

This was apparently a case of idiopathic epilepsy which postmortem examination proved to be a psammoma of the left frontal lobe, with hydrocephalus. Epilepsy among primitive people is thought to be due to the possession of demons, animal spirits, escape of soul from the

29. Redlich, E.: Die Psychosen bei Gehirnerkrankungen. Aschaffenburg: Handbuch der Psychiatrie, Spez. Teil III, Bd. II, 1912, p. 335.

30. Meynert: Klinische Vorträge über Psychiatrie, Wien, 1890, p. 267.

31. Dupré, E.: Psychopathies organiques, in Ballet, G.: "Traité de pathologie mentale," Paris **6**:1184, 1903.

32. Kraepelin, E.: Psychiatrie, Ed. 8, Leipzig **2**: Pt. 1, 36, 1910.

33. Strümpell, A.: Lehrbuch der Speziellen Pathologie und Therapie der Inneren Krankheiten, Ed. 19, Leipzig **2**:741, 1914.

34. Binswanger, O.: Die Epilepsie, Ed. 2, Wien und Leipzig, 1913, p. 357.

35. Voisin, J.: L'epilepsie, Paris, 1897, p. 293.

36. Tramer, M.: Untersuchungen sur pathologischen Anatomie des Zentralnervensystems bei der Epilepsie, Schweiz. Arch. f. Neurol. u. Psychiat. **2**:202, 1918.

body, and heredity. Civilized races hold that the disease is due to demoniacal possession, the influence of the moon, emotional excitement and lesions of the brain.

Epilepsy is due to various causes, brain tumor occasionally causing this disease. Anatomically there are no changes in the central nervous system pathognomonic of epilepsy.

GLOBAL APHASIA AND BILATERAL APRAXIA DUE TO AN ENDOTHELIOMA COMPRESSING THE GYRUS SUPRAMARGINALIS*

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BRUSSELS, BELGIUM

Tumors involving the cerebral cortex, provided they are small and well limited, may furnish valuable information on cerebral localization.

In Dr. Cushing's clinic I have had the opportunity to observe a patient in whom a small endothelioma compressing the left gyrus supramarginalis had produced global aphasia and bilateral ideomotor apraxia, which disappeared after the removal of the tumor. The essential facts in the history are given in the case report.

History.—Mr. C. (Surgical No. 13344), aged 60, right-handed, in November, 1919, while driving his car experienced sudden numbness in the right arm and hand, with loss of speech. After driving ten miles in this condition, he was able to say only "Yes" and "I don't know." He soon had a generalized convulsion. All symptoms had disappeared by the following day. During 1920 five similar attacks occurred. Between the attacks the patient was apparently normal and continued to perform his duties as treasurer of a bank.

On Oct. 14, 1920, after the usual sensory prodromes, the patient had another generalized convulsion which was soon followed by two other severe attacks. When brought to the hospital the same day the right arm was constantly twitching; he could not understand the simplest orders and could say only "I don't know." The next day the twitchings had disappeared.

Examination.—The general physical examination was negative. Neurologic examination showed slight obscuration of the temporal margin of the left disk without swelling; slight paresis of the right arm which, however, he was continually moving and which showed astereognosis. The radial reflex was exaggerated on the right. Other reflexes and the plantar reflexes were normal. The patient was good humored and made every effort to cooperate.

There was global aphasia. Incomprehension of speech was complete. Sometimes a word was recognized and the patient guessed the sense of the order. No object could be named. Speech was limited to "It is funny" and "I don't know." Alexia was present, and he could write nothing except his name correctly. There was bilateral ideomotor apraxia. When offered a familiar object (matchbox, purse, etc.) he took it with his right hand (with the left only on insistence). He would hide it in his bed, take it out and regard it with perplexity, put it on his head, or execute most absurd movements with it; for example, quick alternative flexion and extension of the elbow. When offered a cigaret and a box of matches together, he put the cigaret in his mouth but executed with the matchbox the same absurd movements. The same confusion, though to a less degree, was apparent when using familiar objects like a fork and spoon in eating. On the succeeding days the same apraxia persisted. The patient frequently turned the head and eyes to the right as though subject to visual hallucinations.

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*From the Surgical Service of the Peter Bent Brigham Hospital.

Diagnosis.—The diagnosis of postcentral tumor was made, based on the sensory features of the attacks, the slight paresis of the arm, the global aphasia and the apraxia (Marie and Foix's syndrome of the gyrus supramarginalis).

Treatment and Course.—On October 19, Dr. Cushing enucleated from the left gyrus supramarginalis an endothelioma measuring 4 by 3.5 cm. (Fig. 1). Its position was easily recognized by the situation of the Sylvian fissure and vein. This was subsequently verified on the roentgenogram by the use of Marie's scheme (Fig. 2). The rest of the cortex seemed quite normal and the brain was under no increase of tension.

The operation, though a simple one, was unfortunately complicated by a postoperative clot which formed in the cavity left by the tumor and

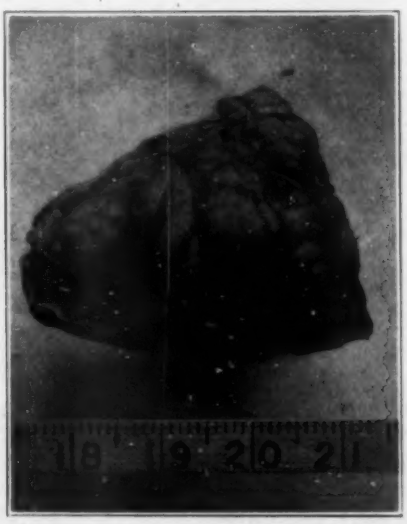


Fig. 1.—Lateral view of the tumor showing dural attachment below.

necessitated reelevation of the flap later in the day. This accident unquestionably produced some local damage, for on the following day there was moderate hemiparesis predominating in the upper limb, without a Babinski sign. The same ideomotor apraxia persisted as before (amorphism of the movements suggested). This naturally could be observed only in the left hand owing to the right paralysis. Power of speech was recovered gradually and was characterized by marked dysarthria and some apraxia (perseveration). Incomplete right hemianopsia was found. Soon the apraxia took a milder character and persisted for more than a month. He had unquestionable comprehension of the act to do, as proved by his mimicry (e. g., his perplexity, Figs. 3 and 4), and his perseverance, was not agnostic, but showed

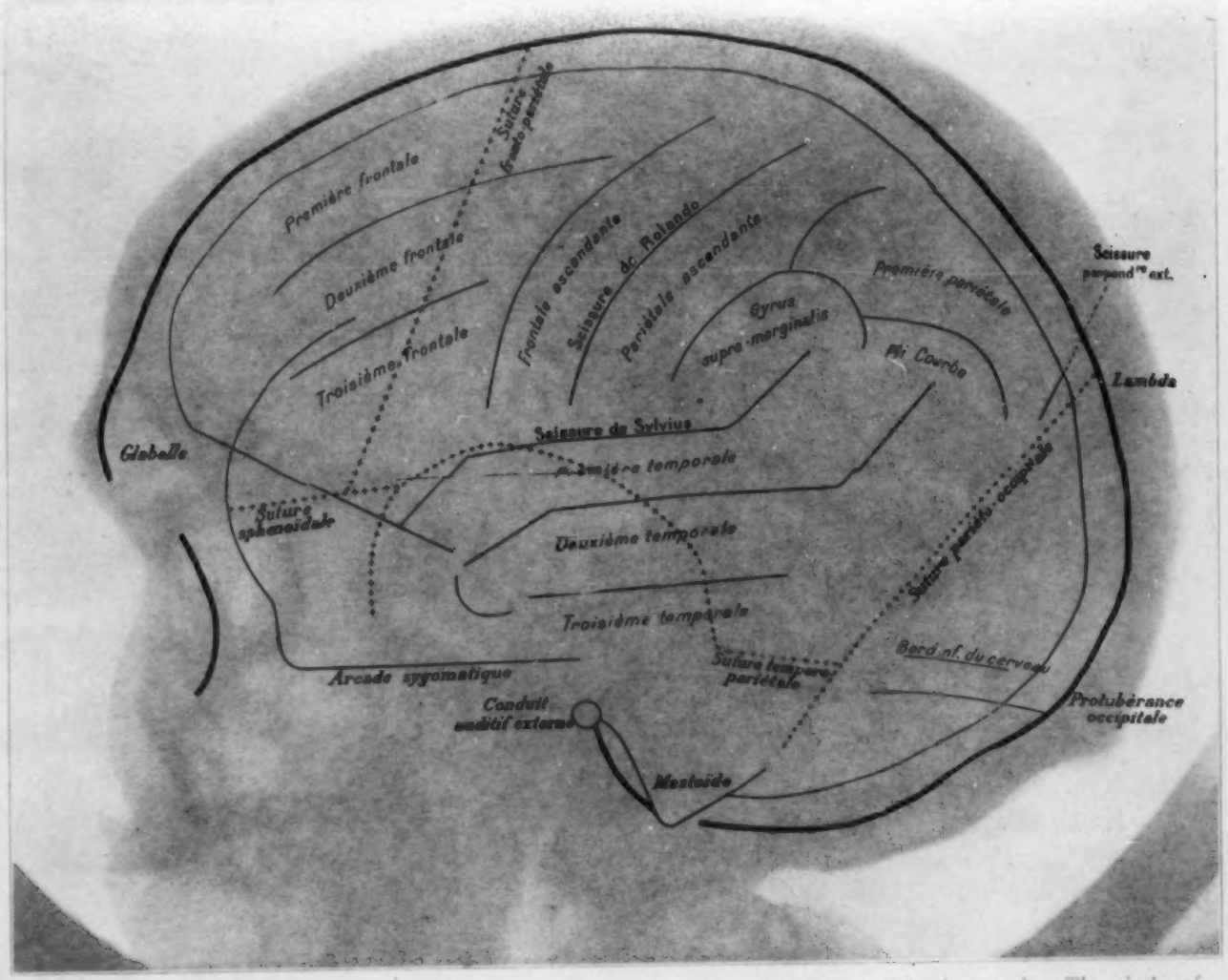
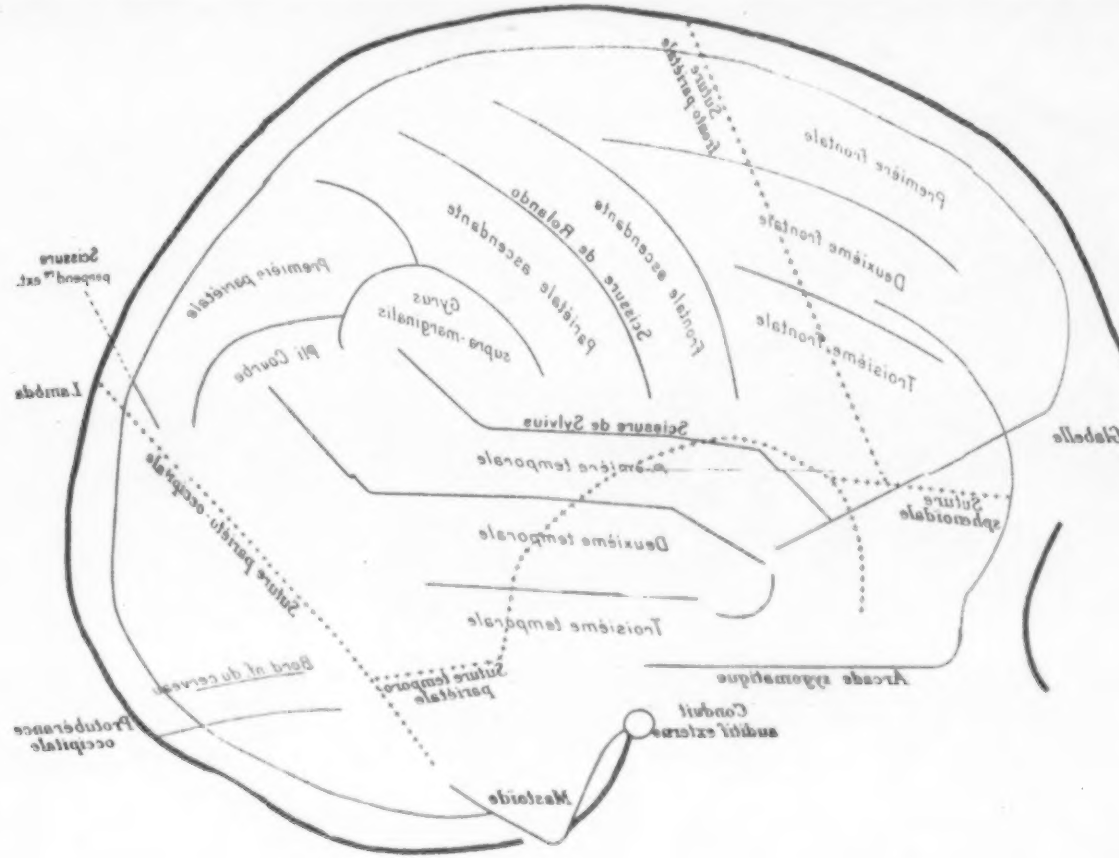


Fig. 2.—Postoperative roentgenogram showing outline of bone flap with dilated diploetic vessels. The circle of silver clips on the margin of the excised dura is shown, and at the center point "X" represents a burr opening in the flap which was the central point of the tumor in which a small bony exostosis was present on the inner surface of the skull. (Compare with Marie's *schéma* indicating the radiographic projection of the cranial sutures and cerebral convolutions.)


Suture fronto pariétale
Première frontale
Deuxième frontale
Troisième frontale
Frontale ascendante
Scissure de Rolando
Pariétale ascendante
Première pariétale
Gyrus supra-marginalis
Pli Courbe
Scissure perpend.re ext.
Lambda
Scissure de Sylvius
Première temporale
Deuxième temporale
Troisième temporale
Glabelle
Suture sphénoïdale
Suture pariéto occipitale
Suture temporo pariétale
Arcade zygomatique
Bord nf du cerveau
Protubérance occipitale
Conduit auditif externe
Mastoïde

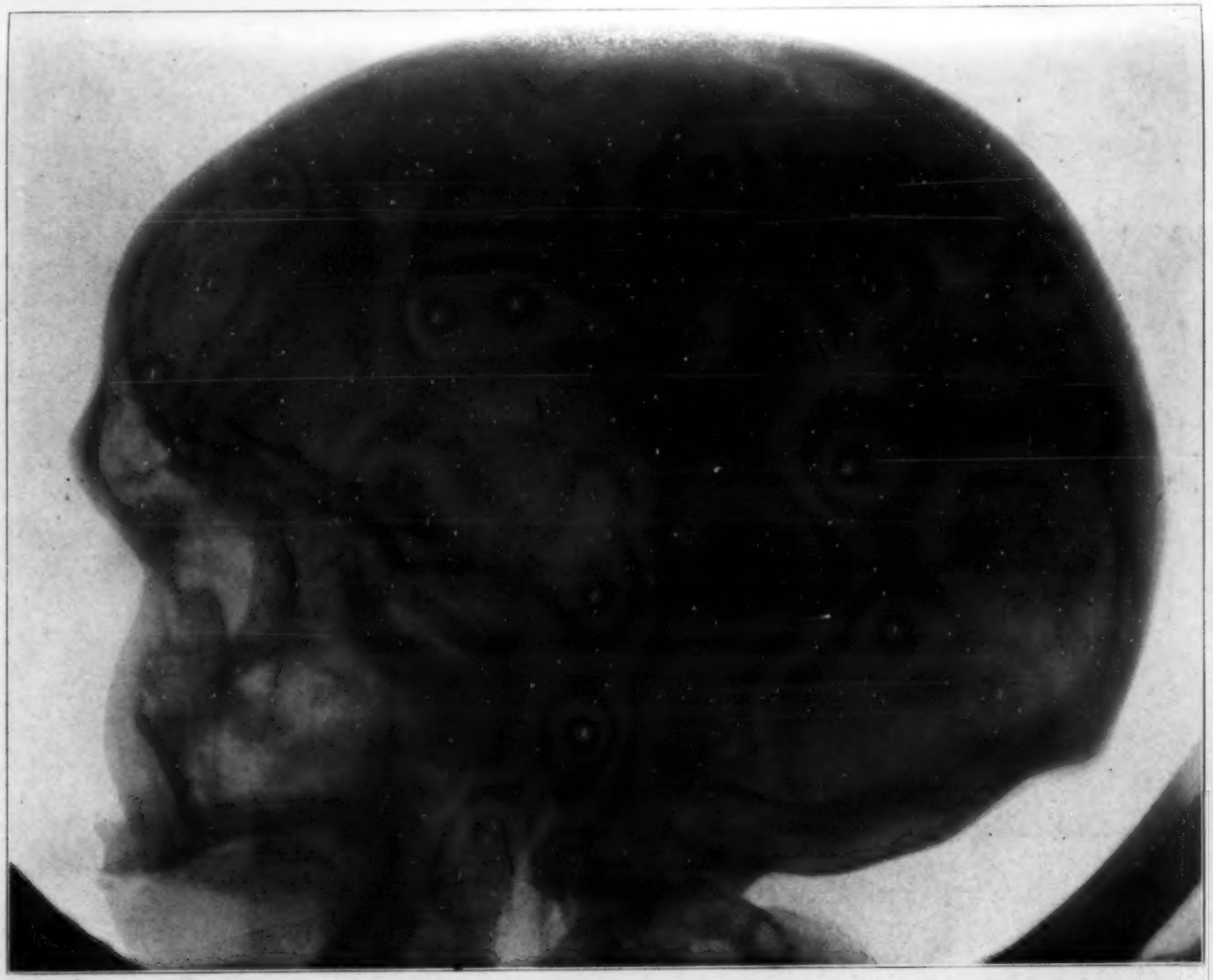


Fig. 2.—Postoperative roentgenogram showing outline of bone flap with dilated diploetic vessels. The circle of silver clips on the margin of the excised dura is shown, and at the center point "X" represents a burr opening in the flap which was the central point of the tumor in which a small bony exostosis was present on the inner surface of the skull. (Compare with Marie's *schéma* indicating the radiographic projection of the cranial sutures and cerebral convolutions.)

Figs. 3 and 4.—Degrees of perplexity of the patient after long unsuccessful trials to light the candle. He had previously been unable to light his cigaret which was finally lighted for him.

either omission of one of the essential elements of the act or its replacement by an inappropriate one (striking the candle against the box of matches, etc., Fig. 5), without special clumsiness of the individual movements. Occasionally he would be able to perform a given test at once, as it were automatically, but when he had failed at the beginning he could rarely accomplish the test (perseveration). The expressive gestures were correct. His mental condition was excellent, as proved by his attentiveness, efforts to reeducate his speech, judgment, sense of humor and entire behavior.

Recovery was progressive and when seen for the last time, three months after the operation, he had still definite dysarthria but only

Fig. 5.—Patient endeavoring to strike the unlighted match on the candle.

slight aphasia (difficulty in writing words containing numerous vowels, but he could read perfectly). There was no further trace of the apraxia. He was in good general condition, could use his right arm perfectly and could walk several miles.

This case seems to fulfil all the conditions required for a brain tumor to furnish valuable evidence regarding localization; namely, a small and enucleable tumor and minimized pressure conditions, as shown by the absence of choked disk or distant symptoms. In three other of Dr. Cushing's patients occasion was offered to appreciate the

practical value of the localizations given by Marie and Foix: In a case of an encapsulated glioma the size of a large hen's egg situated in the region of the gyrus supramarginalis and angular gyrus there was the same global aphasia with apraxia, both of which disappeared after the removal of the tumor, the aphasia and alexia immediately, the apraxia and the agraphia after about eight days. The day following the operation, the patient, an accountant, could sustain a long conversation, was not only clear but witty, and yet when asked, for example, to light a cigaret forgot to strike the match, but struck it against the cigaret in obstinate and vain trials. He said later he thought the matches were "fake ones." This dissociation, during the recovery, between the aphasic and apraxic symptoms is rather interesting.

In two other cases a small gliomatous cyst of the frontal region had produced the type of aphasia characterized by the intensity of the dysarthria contrasting with the relative conservation of the understanding. This represents the syndrome anarthrique of Marie and Foix, which they showed to be produced by a lesion in the posterior part of the second frontal convolution and the adjacent part of the ascending gyrus.

1. A patient with a tumor of the gyrus supramarginalis showed slight paresis of the right superior limb with marked sensory disturbances, global aphasia, and ideomotor apraxia. These are the elements of the syndrome of the gyrus supramarginalis described by Marie and Foix grounded on their experience with aphasia resulting from war wounds.[1]

2. The case agrees with the notion generally admitted of the possible production of bilateral ideomotor apraxia by a lesion at the level of the left gyrus supramarginalis. On account of the small dimensions of the tumor and its superficial situation, compression of the corpus callosum was out of the question. A lesion of the left gyrus supramarginalis has been found responsible for a true bilateral apraxia in thirteen cases of the forty-one with anatomic verification published in 1914 (von Monakow[2]). Marie and Foix, in their series, found apraxia in only two cases of injury of the supramarginal gyrus. They assume that the lesions may not have been sufficiently deep. But it may be that the apraxic symptoms had been transitory. In the other twenty-eight cases quoted by von Monakow, the lesions, always multiple, often extensive, were found in the most various regions of the brain, even in the thalamus (multiple thromboses or hemorrhage in arteriosclerotic brains, tumors of "unusual dimensions"). The inconclusiveness of the anatomic documents, together with considerations on the multiplicity of elements which must compose the normal handling

(Handlung) have led von Monakow to a rather skeptical opinion on the localizing value of the symptom apraxia. Therefore a case like the present one, and even the one alluded to in the foregoing, because they are real experiments, are most instructive.

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1. Marie, P., and Foix, C.: Les aphasies de guerre, Rev. Neurol. **24**:53-87, 1917.

2. Von Monakow: Die Localisation im Grosshirn und der Alban der Funktion durch kortikale Herde, 1914.

THE REVIVAL OF SPIRITISM

PSYCHOLOGIC FACTORS*

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The only method known to science of extracting information from deceased persons is the discovery of documents.—*Sir Oliver Lodge.*

The reconstruction periods following devastating wars are axiomatically characterized by widespread nervous unrest. The causes and effects of this universal state of "nerves" are too familiar to require mention. One of the most readily understood accompaniments of such a period of readjustment is a recrudescence of all kinds of religious activity and of divers affiliated undertakings.

Of these phenomena perhaps the most striking, because of certain personages involved, is the contemporary wave of spiritism.

In the western world this wave, which has taken form in the spectacular missionary tour of England's foremost spirit-scientist, has flowed across the states from East to West, and is now receding through the provinces from West to East. It promises temporary interest or enthusiasm, to be followed by forgetfulness, awaiting the impetus of a later wave.

Were we to inquire into the earliest antecedents of this movement, we should have to go back to the witches of the Old Testament and the oracles of Greece. Early Greek and Roman writers, from the sixth century B. C. onward, have left descriptions of mysterious happenings among which the modern student of ghost lore would have been entirely at home. The wonderful performances of the twentieth century medium, like many another pseudo-novum, had their prototype and pattern in the early days of our race.

ORIGIN OF MODERN SPIRITISM

But it is not with this ancient story that we are here concerned. Modern spiritism dates from 1848. It had its origin in the humble village of Hydesville, near Rochester, N. Y., in the home of a family named Fox. It may not be impertinent here to suggest parenthetically that as it is one of the avowed functions of the Society for Psychical Research to investigate striking coincidences, the circumstance that this

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* Read at the first meeting of the Ontario Neuropsychiatric Association, Kingston, April 28, 1920.

particular family should have borne the name of "Fox" may be worthy of some speculation. Be this as it may, the fact remains that the two Fox sisters, aged 15 and 12 when they began their careers, were the founders of the contemporary school of mediumship.

As the starting point of the modern epoch in the history of credulity, the Hydesville episode merits a few moments' attention. The Fox family, migrating from Rochester to Hydesville, had taken quarters in a house described by a writer of the time as "quiet and respectable, for aught that is stated, and there is no reason to suppose that the timber had been practiced on by elves or the 'good people' who haunt the woods." Shortly after establishing themselves in this house, "they were disturbed after going to bed by various noises—which, however, did not attract much attention, as they supposed them to be made by the rats which do sometimes of themselves have strange doings." At length, after about four months of these experiences, the family one night "determined to go to bed early, so as to get a good night's rest, in spite of all noise, but this was not permitted; the thought then struck Mrs. Fox, whose bed was in the same room with that of her two daughters, that she would question the noise.

"Who makes the noise?" (Silence).

"Is it made by any person living?" (Silence).

"Is it made by one dead?" (Rap).

"By an injured spirit?" (Rap).

"Injured by me or my family?" (Silence).

At this point it was deemed safe and wise to convoke the family and such neighbors as might conveniently be brought to the scene. Further questioning as to the date of the supposed injury, elicited five raps; and when various names were mentioned, there was an accusing rap at the name of a man who had occupied the house about five years previously. Pursuing the interrogation, they were given to understand by affirmative raps that the body of the injured spirit was buried in the cellar and might there be found. They were admonished, however, not to dig for a space of four months. It is recorded that when this period had elapsed some fragments of bone were disinterred in the cellar; but it does not appear to have been ascertained to what animal they belonged, or how long they had lain in the earth.

It will readily be understood that there was no little commotion in Hydesville; and it was not long before the Fox family found it advantageous to leave not only the house, but the village, "as the excitement for or against them was so considerable." The noteworthy circumstance was that in the journeyings of the family, wherever either of the daughters happened to be staying, there the mysterious sounds infallibly occurred; and in due time certain relatives or friends who

had enjoyed association with them likewise developed mediumistic talents.

Within two or three years a veritable spirit epidemic had spread through New York and adjoining states, east, west and south. Séances were the order of the day, or rather of the night; and all the technic and lingo which one may find in any present day textbook of spiritism were fully developed in that middle nineteenth century outbreak. Bereaved parents held converse with their spirit children in dialogues almost identical with those reported in "Raymond" between Sir Oliver Lodge and his departed son; ponderous objects acquired automotive qualities; under spirit influence the force of gravity was set at naught, or intensified a hundred fold, just as Mr. Crawford finds today in Ireland; currents of air, breezes from the beyond, fanned the faces of the faithful; impressive materializations took place; indeed the "direct voice" of the spirit was occasionally heard; nor were there wanting tokens of affection which under cover of darkness were discreetly bestowed on expectant sitters just as in the modern séance room.

The departed great "came through" in high-sounding platitudes, and the foundation principles of nature afterward were enunciated in language singularly out of keeping with the earthly history of the alleged communicants. In the old days, as today, the spirits of mischief were conspicuous and active, and there is ample documentary evidence set forth in the early fifties of the mad pranks of the *Poltergeist,* not only making night hideous but also involving the general dislocation of households and the destruction of property.

Let it be added that in those pre-Society-for-Psychical-Research days the religious factor soon came to be the driving force in the circles of the devotees; death had lost its sting, the grave its victory; the substance of things hoped for had gloriously become the sure evidence of things seen, heard and even handled; the very words which Sir Arthur Conan Doyle has used for a title to a recent book, "The New Revelation," were employed to denote the "new" gospel of 1850, which then just as now—although in the interim the fact seems to have been unaccountably forgotten — was destined to tower above and supersede all other forms of religion.

But we must not delay longer over this story of seventy years ago. It is only necessary to say that all minds were not equally credulous. Even in the early stages of the rappings in the Fox family, there were, as a contemporary critic remarks, ill-disposed and unbelieving people who faintly suggested the daughters as the cause, in spite of their protest of innocence. Eventually their exposure was complete. One investigator concludes his report, which reminds one of the inquiries of the Seibert Commission carried on a few years ago under the auspices of the University of Pennsylvania, with these words:

> In conclusion, let me say, that according to my judgment, nothing of praeternatural or supernatural character took place; and that I was very strongly impressed with the conviction that the three women (Mrs. Fox and her two daughters) were shallow and simple cheats and tricksters, who, perhaps from an accident, had been led on by credulous people to impose upon them.

The Fox episode and its ending are worth bearing in mind because of the fact that notwithstanding the cheapness of their methods and the facility with which they were uncovered, one of the great exponents of the cult in our own day, no less a man than Conan Doyle, harks back to the Fox family as the legitimate sponsors of the new religion which is to regenerate the world. Sir Arthur uses these somewhat astonishing words:

> The lowly manifestations of Hydesville have ripened into results which have engaged the finest group of intellects in this country during the last twenty years; and they are destined, in my opinion, to bring about by far the greatest development of human experience which the world has even seen.

ASPECTS OF SPIRITISM

The modern spiritistic period has been marked by three great waves: the inaugural midcentury wave I have just been discussing, the present postbellum flux, and midway between these the wave which followed the organization of the Society for Psychical Research.

In practice the traffic in spirits has taken on various aspects during this period. It has served as a mode of entertainment. Spiritistic performances have been put on for popular amusement as favorite parlor games. Heavy tables have acquired terpsichorean agility; blindfolded people have been constrained through "telepathy" to execute the will of the sitters; the ouija board has been brought into requisition as a faith-tinged pastime or sentimental diversion. On a larger scale, traveling showmen, with all the paraphernalia of the séance room, have staged exhibitions to delight the million. Such performers have outdone the Witch of Endor in their materializing accomplishments. The most remarkable of these shows in its time, perhaps for all time, was that of the clever handcuff kings, the Davenport brothers, who finally came to grief in their exhibition at Ithaca, N. Y., where some Cornell students made their way unobserved in the darkened room to the edge of the stage, and by turning on several strong flash-lights revealed the modus operandi of the mystical brothers to the satisfaction of all save those perchance who hunger and thirst after deception.

Second, the traffic in spirits has become an organized commercial undertaking. In addition to the itinerants whose business, like that of other conjurers, is to furnish a good show at a stipulated entrance fee, there are multitudes of settled mediums located in practically all the larger towns and cities who make their irregular living out of human credulity and gullibility. It is said that these imposters have a more or

less complete nation-wide organization, with central clearing houses for "spirit information" and elaborate lists of dupes in fact or prospect. This spirit trust has been discussed with considerable documentation by Edward H. Smith in the *Saturday Evening Post* of April 24, 1920.

Third, spiritism has become a country cousin of science. This phase of the movement stands to the "credit" of England where, in 1882, was formed the Society for Psychical Research. A similar organization sprang up in the United States in 1884. In this society were enrolled men prominent in science, literature and the professions. Records of unusual manifestations of all sorts were brought together; spiritistic experiments were conducted under "test" conditions which the experimenters considered satisfactory from the scientific point of view. The sincerity of the leaders of this movement is not to be questioned; and an enormous mass of curious literature represents the fruit of their labor and researches.

Finally, spiritism has become a new religion. This is the logical culmination of the spiritistic movement, as in fact the religious feature has always been the essential one whether recognized or not. Spirit circles have generally adopted the commoner religious rites and ceremonies; and as an intruder in the field of religion spiritism has ever aroused the antagonism of the churches, jealous of their own authority and methods. But now notwithstanding, in the aftermath of the world war, the formal attempt is being made to organize this great body of new-old doctrine into a new religious system. In the opinion of Conan Doyle: "No other religious movement in the world could put forward anything to compare with it." In his "New Revelation" this author vouchsafes to inquiring humanity a description of the life beyond which rivals in details that of St. John, the Divine; but it differs considerably from the latter, and, it may be added, is a trifle more in conformity with what may be taken to be present-day human aspirations.

CONTEMPORARY SPIRITISM AS A RELIGIOUS MOVEMENT

In dealing with the subject of contemporary spiritism, therefore, we must consider it as essentially a religious movement. As a religious development spiritism has followed traditional ways. In the history of religion magic was ever the starting point. In establishing communication between the devotee and the Deity magic rites, presided over by the head of the tribe, were the means resorted to, and were believed to have the virtue of controlling the operations of nature and compelling the favor of the Deity. As religious systems grow and mature along with the cultural progress of the race, magic rites tend to recede into the background, although they have never disappeared completely.

Numerous familiar forms and ceremonies in the church today are plainly reminiscent of the incantations of a cruder age.

The ordinary professional spiritistic séance is a very good replica of the magic rites of primitive society. Indeed the whole spiritistic movement is flagrantly atavistic and reflects the animism of the childhood of the race. Tylor remarked that the "spiritualistic theory belongs to the philosophy of the savages."

We have, then, as a starting point the two-fold fact: Spiritism is a religion; and it is a reflection of the religion of the most primitive stages of human society. This circumstance, that the subject is a religious one, hampers discussion somewhat, and has a peculiar effect on the attitude of the individual. There are certain subjects concerning which the majority of people have a curious mental bias which makes them more or less inaccessible to foreign and conflicting opinions. Among such subjects religion stands conspicuously foremost. Persons of diverging views on religion can rarely be brought to agree. The same may be true of politics, although to a lesser degree; while in the field of science this personal bent or bias is supposed to manifest itself least of all, the standpoint of the individual being determined by objective facts.

This peculiarity and the difficulty attached to the discussion of religious questions may be explained on the basis of the following considerations:

Religion in its highest reaches is essentially an expression or an outgrowth of the affective state of the individual. It is based on feeling rather than judgment, and the function of religion is to serve the most intimate personal needs of the devotee. In his classical treatise on the "Varieties of Religious Experience," Professor James uses these words: "The pivot round which the religious life, as we have traced it, revolves, is the interest of the individual in his private personal destiny. Religion in short is a monumental chapter in the history of human egotism."

Because of these two features, the dominant affective element and its identification with the vital self-interest of the individual, his religious belief may be said to be more a part of himself than any other item in his mental equipment. That it should be beyond the influence of attack or criticism follows naturally enough. These considerations are pertinent in the discussion of spiritism as in any other form of religion.

But just as the majority of people are not absorbingly religious, so the number of spiritists, although now declared to be increasing remarkably, is still relatively small in the total population. The question — What determines a man's deviation toward spiritism? — is only another form of the question — Why is one man more religious than

another? The matter of temperament here demands consideration. It is not too much to say that a person's temperament determines in general what his religious attitude will be. This fact was clearly set forth in Sir William Osler's splendid essay "Science and Immortality." You recall that he divided mankind into three classes: (1) the small band of devoted Teresians living strictly the religious life, willing to die for their belief if need be; (2) at the opposite pole the skeptical or disbelieving Gallionians; (3) while intermediate between the two and making up the bulk of humanity are the indifferent or neutral Laodiceans, who may lean perhaps one way or the other, according to circumstances, but who never go to the extreme of blind faith or agnostic scoffing, and remain more or less undisturbed and unaffected by the zealous activities of their neighbors on either side.

It is well to recognize, therefore, that personal attitudes typified by these three classes are not arrived at by processes of deliberation, logic and judgment, but are first and last questions of temperament, to change which lies not within the power of the individual. While the Laodicean may conceivably vere toward the point of view of the Gallionian or the Teresian, that either of the latter should be transformed would be almost miraculous, if not pathologic. "Let him that is scornful be scornful still" were words which had a deeper meaning than is usually supposed.

BELIEF IN SPIRITS BASED ON TEMPERAMENT

The theory of temperaments until lately had fallen somewhat into neglect in scientific circles, but is again coming into its own. Personality and character studies have led to the contemporary teaching of the *individual constitution* which is a definite and unchanging affair. It represents the hereditary and developmental neuropsychic attitudes, tendencies, and inclinations — the mental sets of the individual — which determine the way of his whole life and which he cannot escape.

This tyranny of our constitutional bents or mental tropisms must ever be borne in mind in considering a subject like the present one; and it must be further remembered that the constitutional trends with which we start early in life become fixed and reinforced as we go along, so that in our middle or later years we may be no more able to think or act out of harmony with them than to break through the steel bars of a prison.

Osler's categories apply equally to spiritism. Looking at the subject in this way it seems fair to conclude that the belief in spirits is not in the last analysis, as believers often take pains to tell us, an acquired belief quite foreign to their former mental habits and based solely on "evidence." Rather I think the belief in spirits is an act in faith temperamentally determined.

The biographies of some of the most noted modern spiritists throw light on this view. It is a matter of fact that all the best known exponents of this system of occultism have practically devoted their lives to the subject. Meyers, Hodgson, Barrett, Lodge, Doyle, all have spent many years in the spirit land. It is well to insist on this point, the significance of which is perhaps not sufficiently appreciated. Assuming the natural constitutional bent, these men having dedicated themselves to the inquiry, grew old in their quest, which assuming for them more and more importance as the years passed, eventually became a veritable obsession.

Quite naturally the leaders in spiritism look on the steps in their career simply as the gradual piling up of evidence which in the end forces conviction. They all emphasize this view of the matter. They take pains to refer to their earlier skeptical attitude, and to point out that they have not arrived at their conclusion prematurely. Being at length compelled to yield to the, to them, overwhelming mass of "evidence," they are at a loss to understand how any unbeliever reading their reports of this "evidence" can escape sharing their belief. But a consideration of the psychology of conviction is calculated to set the matter in a somewhat different light. Concerning his beginnings, Sir William Barrett in "The Threshold of the Unseen" says, "upwards of forty years ago I began the investigation of alleged supernormal phenomena with a perfectly detached and open mind." Referring to Dr. Hodgson, Sir Oliver Lodge remarks, "He devoted years of his life to the subject and made it practically his whole occupation." Conan Doyle in his "New Revelation" declares, "The subject of psychical research is one upon which I have thought more and about which I have been slower to form my opinion, than upon any other subject whatever." To some persons this may be a surprise. Those of us who have known Sir Arthur only as a physician and as the creator of remarkable characters in fiction are perhaps shocked to find that his type of mind should lend itself so readily to a spirit cult.

Hyslop speaks of the "conversion" of Doyle as a recent event which is calculated to help on the cause wonderfully. This view of Conan Doyle's position is obviously erroneous. In the book just referred to he shows that for more than thirty years he has devoted most of his spare time to psychical research; although "it is only within the last year or two that I have finally declared myself to be satisfied with the evidence." According to his own statement, therefore, the subject of spirit manifestation has been in the other's mind more than "any other subject whatever" for upward of a generation.

Conan Doyle indicates some of the steps by which he has arrived at his present position, and it is interesting to follow these. He finished

his medical education in 1882, "like many young medical men a convinced materialist as regards our personal destiny." He declares, however, that he was always "an earnest theist" (personal bent). At first he regarded the phenomena of spiritism as "the greatest nonsense upon earth." But he was thrown with friends who were seriously interested in the matter and whose integrity he could not doubt. His inclination also led him to read all the available literature on the subject. He was "amazed to find what a number of great men thoroughly believed that spirit was independent of matter and could survive it." Even at this early time when he was beginning his medical practice he was much more impressed by the attitude of Crookes, Wallace and Flammarion, who believed, than by Darwin, Huxley, Tindall and Herbert Spencer, who disbelieved. In this early choice what else can we see than an expression of the inherent tendencies of the individual mind which, adequately considered, might have foreshadowed to the psychologic observer the denouement thirty years later which Hyslop speaks of as the "conversion" of Conan Doyle?

The author attended some spirit séances at which tables were juggled about by unseen forces. Being convinced of the sincerity of the participants and unable to explain the phenomena, he declared himself "puzzled and worried." About this time he read "with interest and absolute skepticism" a book called the "Reminiscences of Judge Edmunds" wherein the judge told of his communications through many years, with his dead wife. Of his early séances Sir Arthur preserved notes. "I was still skeptical, but at least I was an inquirer." Moreover, the time that was not actually used for experiments was devoted to reading psychic literature. This reading, he says, "was continuous." The author had now arrived a little further along his predestined way. He had taken part in the reception of numerous spirit messages, some of which were trivial and irrelevant, while others appeared to carry the stamp of genuineness. He states that while he had no proof of their authenticity "they simply left me bewildered." The cumulative effect of the testimony of others began to make itself felt. The agreement of witnesses he felt constituted "some argument for their truth." He came to "appreciate more and more what a cloud of witnesses existed." It is needless to remark that the author's perspective was possibly not calculated to give him a just idea of the dimensions of this "cloud." As Professor Jastrow has remarked: "The obvious fact is strangely ignored that, for one exceptional scientist who subscribes to the reality of such communication, there are hundreds of equal authority who would violently resent the implication that they might be tempted to draw conclusions as to the nature of the universe from the testimony of mediums trafficking upon human credulity."

About 1891 Doyle joined the Psychical Research Society and had the "advantage" of reading all their reports, certainly no inconsiderable accomplishment. It does not seem possible that an investigator would have the patience to labor through this vast accumulation of literature if he were entirely dispassionate and not rather striving, however faintly, toward conviction. This state of mind the author had now reached. The influence of the society, he states, "was one of the powers which now helped me to shape my thoughts."

Sir Arthur was helped on a good way toward conviction by reading Meyers' "Human Personality." The thing which impressed him was the testimony concerning telepathy which he found himself ready to admit as an established scientific fact, in spite of dissenting views of the majority of scientific men. The acceptance of telepathy was a red letter day in Doyle's ghost-land travels. "The ground was cut from under the feet of the materialist and my old position had been destroyed." Having arrived thus far, one does not need to wonder that the few remaining steps were easy, nay inevitable. Starting with telepathy at one end of the series of psychic manifestations, the author found an unbroken chain of phenomena culminating in "actual manifestations of the spirit independently of the body."

MENTAL METAMORPHOSIS OF THE SPIRITIST

Given the necessary temperamental set, any subject which is strongly tinged affectively is likely to get itself so anchored in the subcellars of the mind as to be pursued to the same obsessional length as the spirit quest. Familiar examples are common enough in these days, to mention only certain types of prohibition apostles and vice crusaders, professional reformers, uplifters and self-appointed moral censors of various kinds, ultra-freudologists and antivivisectionists, Christian scientists, feminist extremists, pacifists and red socialists. Such men do not pursue their idea for a time as a fad or diversion and then change it for some other interest; on the contrary, their obsessing idea tends to become a life engrossment, reinforced with the passing years, and from its final utter domination we are probably safe in saying they could not free themselves if they would.

The career of Conan Doyle, as he has himself outlined it, is fairly illustrative of such a gradual mental metamorphosis. Over against his declaration, already quoted, that he had given more thought to psychical research than to any other subject whatever throughout his life, let us set the remark of another eminent scientist to illustrate this question of temperament we are discussing, which determines personal inclinations and attitudes, and which, with respect to any given theory, may make it at the same time impossible for the one mind to accept

and for the other to reject. The remark was made by Huxley in a discussion with Wallace on the topic of spiritism: "It may all be true for anything I know to the contrary, but really I cannot get up any interest in the subject."

To establish the underlying factors of faith we must study the personality of the believers rather than the reasons they bring forward in defense of their belief. It would be profitable to make such comparative personality studies of a group of religious devotees and a group of chronic skeptics. It is possible that their differential psychology might be found to be largely a matter of endocrine glands, smooth muscle fibers and the autonomic nervous system; and their mutual antipathies rather deducible from physiologic than logical factors.

But there is another feature which has been touched on but to which more specific reference must be made. This is the factor of *habit*. Sir Arthur repeatedly refers to his continued experiments and his continued reading along the chosen lines. He explains that it was his "interest" which kept him at it. This is, of course, true. We think and ponder over the thing we are interested in and continue to do so for the same reason. However, this continuance establishes a mental process which becomes, as we say, habitual, and which we know tends to be self-perpetuating even were the interest factor to diminsh. In the case before us, however, interest and the habit tendency obviously work together and strengthen each other. After some years of this sort of thing the course of the mental operations of the individual is irretrievably fixed, and in nine cases out of ten he will follow his natural bent thus established to the end of the chapter.

Let us consider still another factor in the psychologic metamorphosis of conviction, namely, the striving, if one may so express it, of every thought process to arrive at a definite *goal*. Suspended judgment is a painful state; doubt and uncertainty are unpleasant at best and may become intolerable. It seems likely that in certain forms of mental disease definite relief is experienced when anxious uncertainty has been replaced in the patient's mind by the delusional interpretation on the basis of which he can again, after a fashion, adapt himself to his surroundings.

In the nature of things, religious and kindred doubts are the most painful of all. As far as the phenomena of spiritism are concerned, experience shows that inquirers after suspending judgment for a time during which they retain more or less the capacity for dispassionate critique — the skeptical stage, they usually call it — will generally one day end by accepting unreservedly the conclusions toward which their ideas have all along been tending.

The final stage in the mental transformation of the spiritist is that in which he reaches conviction, complete and unassailable, when he

passes from the stage of so-called scientific inquiry to that of absolute faith. This stage may be attained gradually and naturally without any special accelerating event. The affective coloring of the religious motive with its deep personal concern may be sufficient to usher the individual through the various stages until he has reached the final phase of spiritual calm, self satisfied in his clairvoyance of things past and to come.

For some, however, it may be that a special added motive is needed. The war has furnished this motive. For many the bereavement has been almost intolerable, the loss has seemed so unnatural, so cruel and useless. Both Sir Oliver Lodge and Conan Doyle lost a son in the war. In view of their previous history of spirit seeking, what more natural than that the pursuit should now be continued with redoubled zeal and devotion? That the power of self criticism under such circumstances may become very feeble, it is needless to say. The recent activities of both of these men, the inauguration of a new religion by Doyle and the publication of "Raymond" by Sir Oliver Lodge followed by his missionary trip to North America, are the logical sequels of their previous mental careers under the influence of the World War with its bereavements.

CRITERIA OF EVIDENCE ACCEPTED BY PSYCHIC WORKERS

That in the final religious phase of the gradual psychic metamorphosis we have been outlining the power of criticism is very weak indeed is evidenced by the fact that the exposure of fraud has little or no effect on the faith of the devotee. Thus, after the cheap trickery of the notorious Eusapia Palladino had been brought to light and she herself had been discredited, and although, as Hyslop admits, 300 members of the Society for Psychical Research deserted the spirit camp following these events, Sir Oliver could still say, "I am, therefore, in hopes that the present decadent state of the Neapolitan woman may be only temporary, and that hereafter some competent and thoroughly prepared witness may yet bring testimony to the continued existence of a genuine abnormal power in her organism." Can such a sentiment as this express anything else than a downright headlong will to believe in spite of everything?

Sir Oliver describes another incident which might have shaken the faith of any not unwilling to be undeceived. F. H. W. Meyers had written a message which he had delivered in a sealed envelope to Sir Oliver, to be used as a test after the writer's death. Shortly after this event the message was subjected to mediumistic influence, but not until fourteen years had elapsed was the time deemed ripe to make trial whether the contents of the sealed envelope had been telepathically discerned. The result was complete failure. A sealed message written

with similar intent by Richard Hodgson is in existence, and a reward of $1,000 has been offered to any medium who can reveal it. The reward remains unclaimed.

The quality of the faculty of criticism when under the coercion of faith is further illustrated by the acceptance of the alleged messages from Meyers by Sir Oliver as genuine, although the former was unable during fourteen years following his death to infuse into the mind of any medium the contents of the sealed message which he had expressly prepared for that purpose, and in face of the testimony of Meyers' widow on the subject of these messages, in which she declared, "after a very careful study of all the messages we have found nothing which we can consider of the smallest evidential value."

Reference might here be made to the findings of that indefatigable promoter of things psychic, Mr. Hereward Carrington, in his compilation "The Physical Phenomena of Spiritualism." This authority essays to distinguish "fraudulent" from "genuine" phenomena. In a text of 417 pages he finds it necessary to devote 318 to the former. Those who regret that Mr. Carrington's "genuine" phenomena were only sufficient to fill one fourth of his book, are doomed to further disappointment when they come to this statement (p. 336): "There may be much fraud in modern spiritualism, in fact, I am disposed to believe that fully 98 per cent. of the phenomena, both mental and physical, are fraudulently produced, but," etc.

The disappointment of the reader seeking light in this volume will be grievously supplemented by bewilderment when he discovers that the difference between the "fraudulent" and "genuine" manifestations, for aught that is revealed in the text, lies secluded in the psychic eye of the author. The same kinds of "tests" are described in both sections of the book, the distinction being that the author believes in the one group and disbelieves the other. Moreover, in the "fraudulent" section there are pages devoted to the trick methods by which similar phenomena recorded in the "genuine" section can be produced.

Finally the seeker's disappointment and bewilderment will merge in confused despair when he realizes that the "genuine" matter is made up all but entirely of a series of quotations. Why should these devoted researchers be able to develop no manifestations of their very own? Hidden away in the mass of this book are two pages in which Mr. Carrington records the sum of his personal psychic experiences. These consisted in certain rappings heard in his room at night at about 10 or 11 o'clock and continued until he went to sleep. These noises, which he avers did not sound like creaks, recurred during four or five weeks; one night he located them on his mantel piece, and laying his hand thereon, felt distinctly the vibration of the wood. Therefore Mr.

Carrington believes in raps. He admits, however, that he could get no intelligence from them. Also, he has sat by the hour over the planchette, but without result. At length one night, at 11 o'clock, his eyes being too tired to permit him to work, he again resorted to the mystic apparatus. By 2 a. m. he had obtained "a few vague scratches." As he was about to give up in disgust there came on the planchette board a few faint raps; then again continued silence. Verily the progeny of the laboring mountains should not after all have been regarded so contemptuously.

Were it desirable to examine further the criteria of evidence which satisfy the psychic researcher, we might cite almost at random the spoken and written words of the author of "Raymond." In an earlier work, "The Survival of Man," Sir Oliver gives his qualifications as an authority on spirit manifestations. "A physicist," he declares, "can make no assertion on it one way or the other. . . . As a physicist I do not know; these are not processes I understand." But spirit information being of a different brand must needs come by other channels than those by which all the rest of our experiential data are acquired; and where faith enters in the censor, logic, nods. Sir Oliver accepts telepathy, but not by the methods of demonstration or the processes of reasoning by which he accepts the facts of science. Such rigid criteria he gives over entirely. He has experimented with telepathy but states that he has not been able personally to demonstrate it. As a "percipient" he failed. For example, when the "five of diamonds" was telepathed to him he got "scissors." As "agent" he likewise failed in the majority of cases. He has known of happenings, however, of which, to the neglect of the law of parsimony, telepathy has seemed to him the sole explanation; and for proof and reason he can only say: "to the best of my scientific belief no collusion or trickery was possible." He had expressed similar belief in Eusapia Palladino.

Let me add a single quotation from "The Survival of Man" (p. 321), which most strikingly exemplifies the polar divergence between the method of arriving at scientific conclusions and that of reaching spiritistic conviction.

> The old series of sittings with Mrs. Piper convinced me of survival, for reasons which I should find it hard to formulate in any strict fashion, but that was their distinct effect. They also made me suspect—or more than suspect—that surviving intelligences were in some cases consciously communicating—yes, in some few cases, consciously; though more usually the messages came in all probability from an unconscious stratum, being received by the medium in an inspirational manner analogous to psychometry.

Would one suspect that the foregoing sentence had been written by a scientist?

A certain characteristic religious intolerance also begins to make its appearance in the writings of this author. In "Raymond" he refers to the "little systems" and "contemporary blindness" of those who do not subscribe to his hypothesis; he speaks of the "assumptions and blind guesses" of men of the materialistic school, and adds this further vocal boomerang, "their device being to anticipate and speak of what they hope for, as if it were already an accomplished fact."

Professor Jastrow, commenting on the type of mind revealed in these various quotations, says:

> The phenomenon is a puzzling one; for we associate with the effect of a professional training a general robustness of logical vigor, a thorough saturation of the mind in all its vocations with the habits of rigid evidence and critical caution. We assume a consistency of mental habit, and in that assumption seemingly go astray. We must make room for the existence of minds streaked with rationality but not uniformly penetrated by the stabilizing quality; we must consider reserved areas of prejudice and predilection in which ideas flourish and convictions are cherished with slight regard to their reconciliation with the dominant logicality of the rest of one's beliefs.

But enough has been said to indicate quite clearly that in dealing with the spiritistic theory, we have to do in the main with matters of faith and religious aspiration rather than with the processes of dispassionate scientific inquiry. Indeed the religious climax of the spirit quest following the world war is clearly expressed by Sir Oliver. "For many years I held my tongue but I have come out since the war more into the open because of the extensive bereavement which could be comforted." Here we see the ultimate end of all religious systems, to bring spiritual consolation and assurance which shall satisfy the personal longing and self seeking out of which all religious systems develop.

Conan Doyle similarly describes the effect of the war in his own case. Had it not been for this cataclysm, he says, he might have "drifted on for my whole life simply as a psychic researcher." But in the midst of the agony of war bereavement, "I seemed suddenly to see that this subject with which I had so long dallied was not merely a study of a force outside the realms of science, but that it was really something tremendous, a breaking-down of the walls between two worlds, a direct undeniable message from beyond, a call of hope and of guidance to the human race at the time of its deepest affliction." This language might fit beautifully into an impassioned religious exhortation but it has nothing to do with the calm consideration of scientific facts. The author is no longer an inquirer but a believer. The labor of investigation is over. The voyage is done and the believer is safe in the harbor of his spiritual revelations. As the author expresses it, "the objective side of it ceased to interest, for having made up one's mind that it was true, there was an end of the matter. The religious side of it was clearly of infinitely greater importance."

The *age* factor has only indirectly been referred to. This must also be taken into account. No explanation of the fact that religious reflections and practices tend to increase with advancing years is necessary; not only do latent tendencies grow active, but there may take place what at first glance appears to be a constitutional transformation, in that a strikingly irreligious youth is succeeded by a devout old age, bitterly repentant of the "errors" of earlier life. These epochal changes are common enough and will be found not to controvert the idea of temperaments and mental sets which we have been developing. These circumstances may not be of major importance in the present question, but what is of importance is the fact that habitual mental reactions tend to become unalterably fixed in later life, due not only to the habit factor itself in its anatomic and physiologic bearing, but *pari passu* to the loss of psychic resiliency in old age with its intolerance of the unaccustomed. It is doubtful if the old man, or any of us who are getting on, appreciates what a slave he is becoming to his habitual tendencies in thought and conduct. For the person who has grown old in a religious belief, spiritistic or otherwise, true or false, there is probably no mutation possible.

SUMMARY

We have come to the final step of our inquiry. We have seen that the leaders of the spiritist movement are men of a certain disposition of mind which predisposes them to this pursuit, which they follow with devoted and increasing interest throughout their lives. The motive of this interest is religious craving, the seeds of which are sown in every breast. For some the age-worn forms of orthodox religion are unsatisfying, and a pseudo-scientific garnish like that of psychical research supplies the necessary appeal. The mental metamorphosis of the spiritist is not difficult to trace. He feels himself at first a skeptic, then a curious onlooker, then an interested inquirer, then an earnest seeker; and finally by this declension a devout believer. If he is called on to describe the process he declares that he has approached the subject with an open mind, and that steadily accumulating "evidence" has at length inevitably forced conviction on him without any motion of his own. What he will not tell you is that having a personal bent for the occult or the shady side of science, the demands of his nature have forced him to devote time and attention in increasing measure to these matters; that the driving force of ultimate personal need has caused him to discern evidence where another might have found only accident, coinicidence, or utter irrelevancy; and that under the enslaving influence of habit crystallized by the passing years, what began as a more or less dispassionate inquiry has ended as a veritable spiritual quest, pressing onward even to the threshold of the abnormal.

Are the celebrated men who lead the spiritist movement justified in their public attitude and propaganda? Their own answer to this question has been heard. They hold themselves to be the ministers of a new religion more important than any the world has ever seen, a religion not only destined to supersede all others and bring final peace and satisfaction to humanity while in the flesh, but which answers better than any other the ingrained human aversion to extinction, and which vouchsafes a livelier picture than any other religion of the assumed existence beyond the grave. With such a conception of their high mission, these men cannot do otherwise than go out into the world and preach their gospel. Such an act is merely reflex to the circumstances which have led up to it.

There are certain consequences, however, of which we are bound to take account. Sir Arthur and Sir Oliver may be honest and devout, but the school of spiritism is broad and shelters many less luminous characters. The traffic of the ghost monger is notorious and baneful, and the encouragement which these shady characters receive from the campaign of the leaders of the psychical movement cannot but be lamented.

The point has been raised that this new religious system gives comfort to the bereaved at the time of greatest need. The leaders expressly bring forward this as the supreme object of their work. How far this attitude is justified may be open to serious question. There is little doubt that the bereaved parent concentrating emotionally on the memory of the dead child may eventually come into a mental state in which he believes himself in relationship with that child or in which he may even catch a vision or hear his voice. These abnormal states are familiar in mental medicine, and while by cultivating them a certain amount of satisfaction may be gained, it is legitimate to ask whether this is the wholesome and most suitable method of dealing with states of bereavement and sorrow. It may be that certain otherwise stable minds may indulge in these operations, derive a degree of comfort and suffer no serious injury; for others, however, the procedure is distinctly unwholesome, if not dangerous, and to encourage it is to take risks unwarranted by any established facts.

BLOOD SUGAR STUDIES IN DEMENTIA PRAECOX AND MANIC-DEPRESSIVE INSANITY*

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A study of a number of cases of dementia praecox and manic-depressive insanity from the point of view of blood sugar tolerance, as determined by means of Benedict's [1] modification of the Lewis-Benedict method for the determination of sugar in the blood, has been made. Such a study was regarded as of special interest because of the apparent meagerness of mention in the literature of previous work in this field. At the onset of our experiment the only reference of any pertinence was that of Weston [2] in which presentation is made merely of single (apparently nonfasting) blood sugar determinations upon a series of patients classified essentially upon the basis of ward behavior, rather than of actual clinical status. In another article appearing since, Weston [3] reports a second series of cases of dementia praecox and manic-depressive insanity in which single fasting bloods were examined for glucose according to the technic of Meyers and Bailey, and in which apparently no essential deviation from normal was determined. We agree that the fasting levels are well within the normal range and that they in themselves carry little or no diagnostic value. On the other hand, we do believe that a series of determinations which shows how the body handles glucose in a comparative way over a given period of time may be of diagnostic value, at any rate of great physiologic importance. We may mention that Weston in his first paper also used the Meyers and Bailey [4] blood sugar technic which is a modification of the Lewis-Benedict method. It is essentially the same as the Benedict modification of the Lewis-Benedict method except that it provides for less dilution of the blood, so that the final reaction may take place in a more concentrated mixture of glucose and picric acid and yet avoids the long process of boiling to dryness as indicated in the original method. Benedict uses a dilution of 1 to 12.5 while Meyers and Bailey use a dilution of 1 to 5.0.

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* From the State Psychopathic Hospital, Ann Arbor, Mich.

1. Benedict, S. R.: A Modification of the Lewis-Benedict Method for Determination of Sugar in the Blood, J. Biol. Chem. **34**:203 (April) 1918.

2. Weston, P. G.: Sugar Content of the Blood and Spinal Fluid of Insane Subjects, J. M. Research **35**:198 (Nov.) 1916.

3. Weston, P. G.: Analyses of Blood of Insane Patient, Arch. Neurol. & Psychiat. **3**:147 (Feb.) 1920.

4. Meyers, V. C., and Bailey, C. V.: J. Biol. Chem. **24**:147, 1916.

An extensive communication by Kooy,[5] appearing as the present paper was being prepared for publication, reports a series of cases of dementia praecox, epilepsy, dementia paralytica, "anxious melancholia" and "nonanxious melancholia," in which carbohydrate tolerance tests were performed. Fasting bloods were taken; the patient was given breakfast consisting of 100 gm. of bread and 200 c.c. of milk; bloods were then drawn every three-fourths hour for two and one-fourth hours and examined according to the Bang technic. The author attempts to show that the various groups named above give characteristic curves. A glance at the composite curves illustrated by Kooy on page 281, reveals that all curves are practically parallel and that the only differential point is the acme level. The author asserts that this difference in acme level is due to the different emotional character of the diseases. He then gives a detailed discussion on epinephrin in different emotional states and its importance in mobilizing the glycogen of the liver in consequence of which more glucose is found in the peripheral blood. He further discusses the "piqûre" of Claude Bernard and the "piqûre" of Sachs-Aronsohn causing hyperglycemia, showing that the latter is effected by a hypersecretion of epinephrin. Nothing is said, however, of a prick of the skin causing a varying output of epinephrin depending on the emotional reaction of the patient. We shall later discuss the lack of differential value of the curves he obtained. Further, although this metabolism experiment is well controlled from the standpoint of disease, temperature, environment, rest of the patient during the experiment and the patients' age, there is absolutely no control as to the subject's weight. At least no account of it is given in the paper. This certainly is a serious criticism when we know how important the surface area is in all metabolism experiments.

PROCEDURE

The exact procedure in our work was, for the sake of uniformity, essentially that recommended by Janney and Isaacson[6] in April, 1918, which seems to have become practically standard for this type of investigation. Thus each patient was required to fast from 7 p. m. of the evening preceding the test day until the completion of the test on the succeeding morning. At 7 a. m. on the test morning, vein puncture was performed and the patient was required to ingest a definite weight of glucose (1.75 gm. per kilogram of body weight) dissolved in 2.5 c.c. of distilled water per gram of glucose. Blood was then drawn for three successive hours following the administration of the glucose. The urines were tested for glycosuria in all cases. The actual technic

5. Kooy, F. H.: Hyperglycaemia in Mental Disorders, Brain **42**:214, 1919.

6. Janney, N. W., and Isaacson, V. I.: A Blood Sugar Tolerance Test, J. A. M. A. **70**:1131 (April 20) 1918.

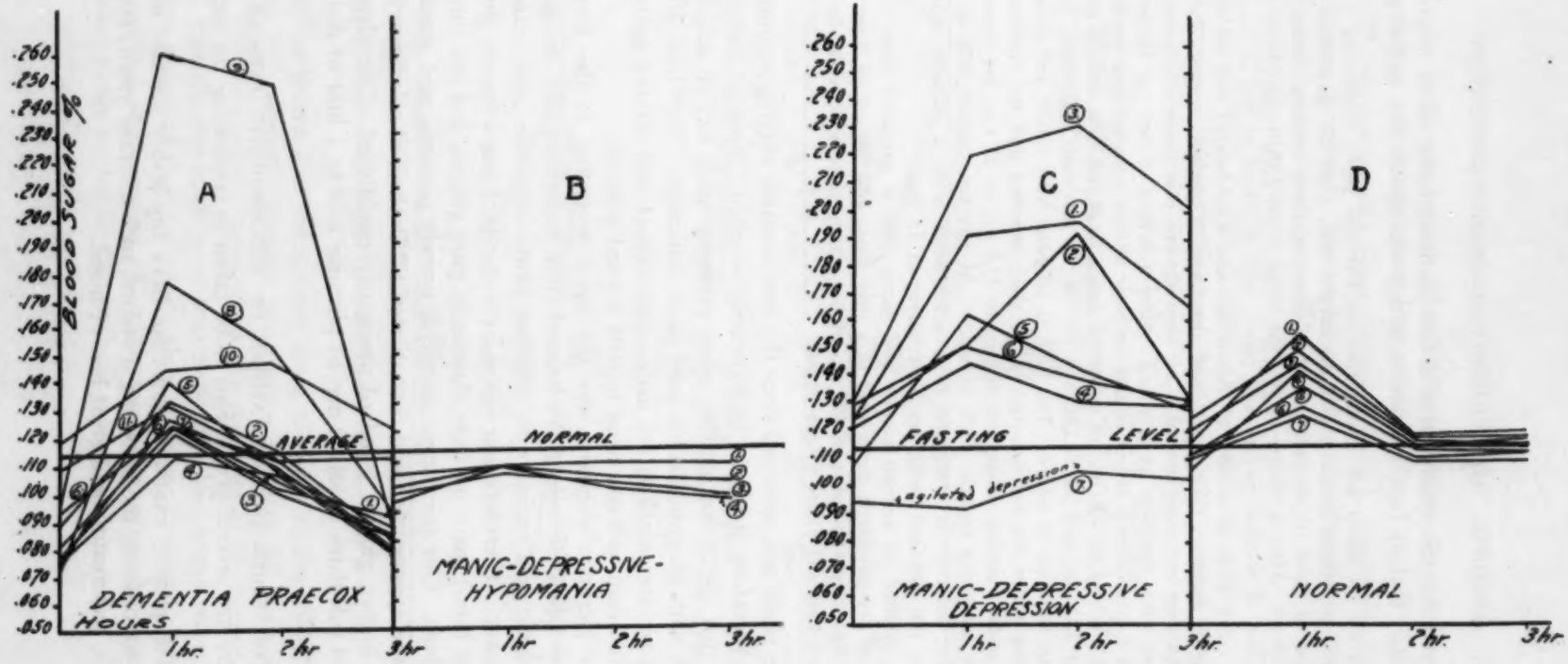

Fig. 1.—Composite sugar tolerance curves for normal and psychotic subjects.

employed for the quantitative determination of the blood sugar was essentially that of Lewis-Benedict, which was specifically as follows:

> Two c.c. of blood are drawn into an Ostwald pipet, containing a little powdered potassium oxalate, and discharged into a 25 c.c. graduated flask. The pipet is twice rinsed out with distilled water, these washings being added to the blood. After a minute or two the blood is practically completely laked. A solution of sodium picrate and picric acid is added to the 25 c.c. mark (using a few drops of alcohol to dispel the foam if necessary) and the mixture thoroughly shaken. (We never used any form of alcohol or ether for antifoam, because our experimental work soon showed that these substances gave the same color reactions as glucose.) After a minute or two (or longer) the mixture is poured on a dry filter and the clear filtrate collected in a dry beaker. Exactly 8 c.c. of the filtrate are measured into a large test tube bearing graduations at 12.5 c.c. and 25 c.c., and 1 c.c. of 20 per cent. anhydrous sodium carbonate solution is added. The tube is plugged with cotton and immersed in boiling water for ten minutes. It is then removed and the contents are cooled under running water and diluted to 12.5 c.c. or 25 c.c., the amount of dilution depending on the depth of color. At any time within half an hour the color solution is compared in a colorimeter with a suitable standard solution, the standard being set at a height of 15 mm.
>
> The solution of sodium picrate and picric acid is prepared thus: Place 36 gm. of dry powdered picric acid in a liter flask, add 500 c.c. of 1 per cent. sodium hydroxid solution and 400 c.c. of hot water. Shake occasionally until dissolved, cool and dilute to one liter.

The picric acid obtained since the war contains varying amounts of water; therefore, it cannot be accurately weighed. Benedict has determined that the above solution when properly made has an acidity of 0.04 N. with phenolphthalein used as an indicator. Therefore, all our sodium picrate solutions are made approximate and titrated against a standard alkali and corrected to 0.04 normal solution.

Our picramic standard was not made according to the formula given by Lewis-Benedict. We learned from experience that the quality of picramic acid varied with different firms—thus the color standard would vary. Therefore, our initial color standard was a known glucose (0.1 per cent.) made up from chemically pure glucose and run through the technic. Our permanent standard, namely picramic acid standard, was made approximate and then diluted till it checked colorimetrically with a known glucose standard previously established. Our picramic standard calculates about 70 mg. of picramic acid to 1 liter of distilled water.

BLOOD SUGAR DETERMINATIONS IN NONPSYCHOTIC PERSONS

There are several precautions to be taken in controlling the experiment:

1. The persons examined must not have any bodily diseases which are apt to influence the blood sugar record, such as brain tumor, fevers, nephritis, pancreatitis and great loss of blood.

2. The body temperature of individuals examined must be within normal range; all febrile cases are excluded.

3. The temperature of the environment must be practically constant for all cases examined. Therefore, all subjects were kept in the ward till the examination was complete.

4. No control case was used in which there was fatigue or exhaustion from overwork or lack of sleep. Those subjects whose resistance was apparently below normal were not used as a control. Previous

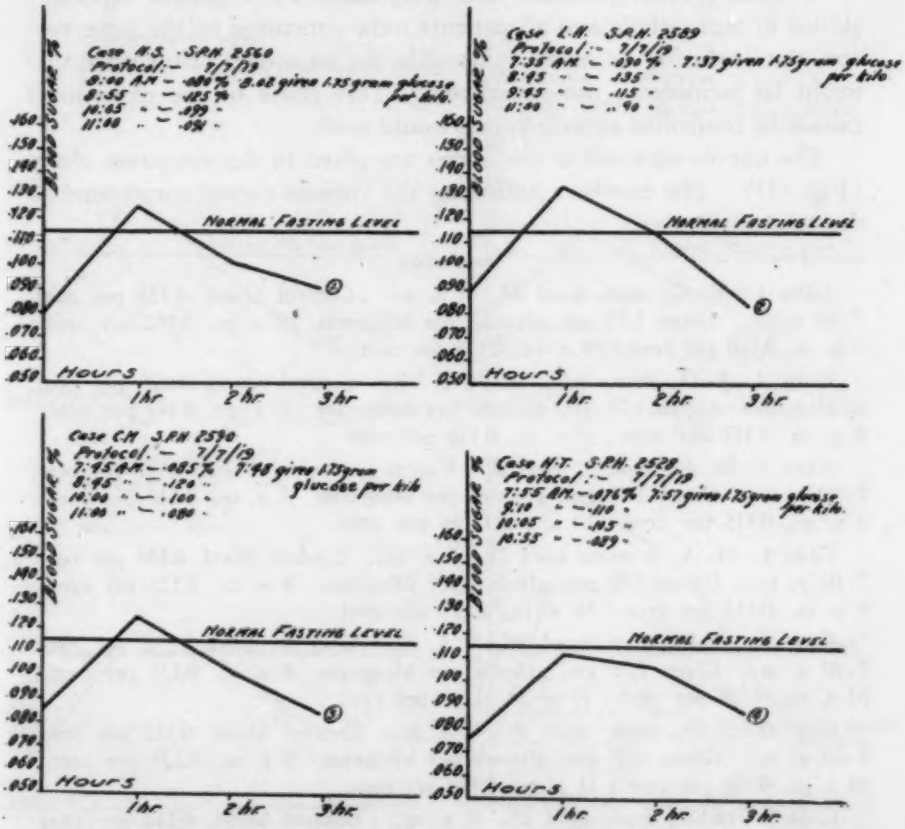

Fig. 2.—Individual sugar tolerance curves in dementia praecox.

work has shown that such cases show a lower fasting blood sugar record than normal. Fatigue, exhaustion and lack of sleep may all enter into the psychotic cases, often as a symptom of the disease.

5. Age we also know is of importance in blood sugar records. As persons grow old they frequently show a higher threshold and thus a higher blood sugar record. Our controls were chosen to include the same age range as that of the psychotic cases.

6. Of course, no control patient was permitted to work. The psychotic patients conducted themselves as usual.

7. None of our psychotic patients were obese and none were emaciated. Therefore, these two groups were not included in our controls. Weight was further controlled by giving the patient 1.75 gm. of glucose per kilogram of body weight, it being well known that even normal persons have a different rate of metabolism, which in turn bears some relation to weight.

8. Finally, vein puncture was performed by a person especially skilled in that technic and all patients were punctured by the same person, thus reducing as much as possible the emotional disturbance that might be incident to the experiment. This phase of the experiment cannot be controlled as well as one would wish.

The curves obtained in this series are given in the composite chart, (Fig. 1D). The numbers indicating the various curves correspond to the respective cases.

PROTOCOLS

Case 1.—M. C., man, aged 55. 7 a. m.: Control blood, 0.115 per cent. 7:02 a. m.: Given 1.75 gm. glucose per kilogram. 8 a. m., 0.152 per cent.; 9 a. m., 0.120 per cent.; 10 a. m., 0.118 per cent.

Case 2.—J. D., man, aged 35. 6 a. m.: Control blood, 0.125 per cent. 6:02 a. m.: Given 1.75 gm. glucose per kilogram. 7 a. m., 0.147 per cent.; 8 a. m., 0.117 per cent.; 9 a. m., 0.116 per cent.

Case 3.—M. F., woman, aged 20. 7 a. m.: Control blood, 0.121 per cent. 7:02 a. m.: Given 1.75 gm. glucose per kilogram. 8 a. m., 0.140 per cent.; 9 a. m., 0.115 per cent.; 10 a. m., 0.116 per cent.

Case 4.—H. A., woman, aged 19. 7 a. m.: Control blood, 0.105 per cent. 7:03 a. m.: Given 1.75 gm. glucose per kilogram. 8 a. m., 0.135 per cent.; 9 a. m., 0.113 per cent.; 10 a. m., 0.111 per cent.

Case 5.—C. H., man, aged 30. 7 a. m.: Control blood, 0.112 per cent. 7:03 a. m.: Given 1.75 gm. glucose per kilogram. 8 a. m., 0.131 per cent.; 10 a. m., 0.108 per cent.; 11 a. m., 0.110 per cent.

Case 6.—S. H., man, aged 19. 8 a. m.: Control blood, 0.112 per cent. 8:03 a. m.: Given 1.75 gm. glucose per kilogram. 9 a. m., 0.123 per cent.; 10 a. m., 0.108 per cent.; 11 a. m., 0.110 per cent.

Case 7.—D. T., man, aged 25. 8 a. m.: Control blood, 0.110 per cent. 8:03 a. m.: Given 1.75 gm. glucose per kilogram. 9 a. m., 0.122 per cent.; 10 a. m., 0.107 per cent.; 11 a. m., 0.107 per cent.

PSYCHOTIC GROUP

This group includes eleven cases of dementia praecox and eleven cases belonging to the group of manic depressive insanity. Of the latter group, four patients were of the hypomanic phase and five were typically of the depressed phase. Two other patients, Cases 3 and 7, presented a somewhat atypical form of depression, but clinically seemed to belong in this group.

The exact psychiatric status of the cases may be determined from the accompanying abstracts of case reports, all of which were kindly prepared by Dr. A. M. Barrett.

The individual protocols and curves are represented graphically by Figures 2 to 7, and in the composite chart (Fig. 1).

DEMENTIA PRAECOX GROUP

Eleven cases are included in this series. Nine patients (Cases 1 to 9) were in acute phases of the disease and two (Cases 10 and 11)

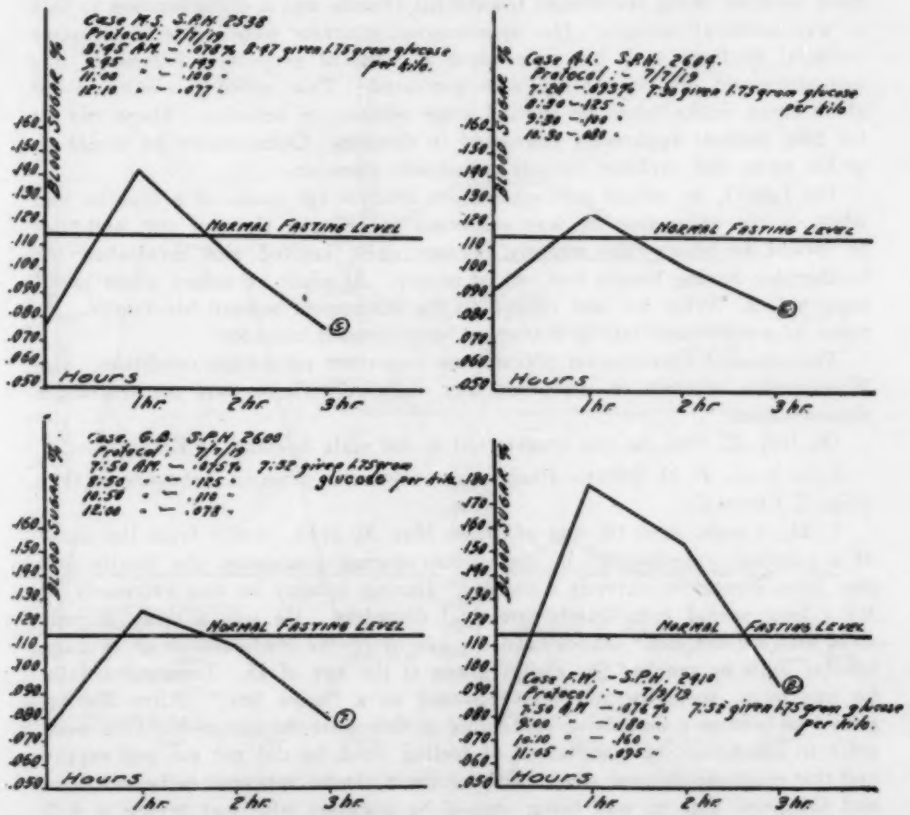

Fig. 3.—Individual sugar tolerance curves in dementia praecox.

had for some time shown no acute symptoms and were in a condition of mild deterioration (Fig. 1*A*, Curves 1 to 11; Figs. 2, 3 and 4, Curves 1 to 11).

CASE 8 (S. P. H. 2560).—Diagnosis: Dementia praecox, paranoid type (Fig. 2, Curve 1). N. S., a man, aged 25, admitted to the State Psychopathic Hospital, Ann Arbor, April 29, 1919, whose family were free from nervous or mental disorders, had always been considered an odd individual. He never mixed well with other people and kept himself isolated in the family.

He was drafted into the National Army and sent to Camp Custer on Aug. 28, 1918. He showed considerable anxiety over this, and remarked that he wished that he had married, as that would have kept him out of danger. About that time a relative had been drowned from a torpedoed transport and he seemed to fear that the same fate awaited him. At Camp Custer he did not do well and on Jan. 8, 1919, he was discharged and returned to his home. There he was apathetic, showed no inclination to find work and spent most of his time in his room, smoking incessantly. On his admission to this hospital he was irritable, resented having been brought here, and refused to cooperate in the examinations. For the first few days, he was surly and threatening in his attitude. There was marked disinterestedness in his surroundings, his chief reaction being resentment toward his friends and a disinclination to talk of any personal matters. His spontaneous interests were centered in some financial dealings with his sister over a piece of property. Whenever this was discussed, his irritability was increased. This attitude continued for about three weeks, when he showed some oddities of behavior. He would sit for long periods apparently engrossed in thought. Occasionally he would go to his room and perform various calisthenic exercises.

On June 1, he talked somewhat more freely. He spoke of a fear he had while in the army that he was suspected of being a German spy, and that he would be shot. He recently became quite excited and threatened his brother for having beaten him out of money. At night he talked while seemingly asleep. What he said related to his resentment toward his family. At times he would burst out in boisterous, unmotivated laughter.

The physical examination revealed no important pathologic condition. The Wassermann reaction on the blood was negative. There were no neurologic abnormalities.

On July 22, 1919, he was transferred to the state hospital at Kalamazoo.

Case 9 (S. P. H. 2589).—Diagnosis: Dementia praecox, hebephrenic type (Fig. 2, Curve 2).

L. H., a man, aged 19, was admitted May 30, 1919. Aside from the death of a paternal grandmother in convulsions during pregnancy, the family was free from mental or nervous disorders. During infancy he was extremely ill for a long period from gastro-intestinal disorders. He was a weak, anemic child and did not enter school until the age of 7. He continued as an average scholar until he reached the eighth grade at the age of 15. Temperamentally he was quiet, seclusive and was regarded as a "home boy." After leaving school he became a machinist, continuing at this until the age of 19. One week prior to admission, he complained of feeling tired, he did not eat any supper and that night he did not sleep. During the night he appeared to be delirious and imagined that he was being chased by someone who was trying to kill him. He complained that his persecutors had murdered others and were trying to put the responsibility onto him.

For several days he was apprehensive and much perplexed. One day he stripped off his clothing and left the house nude, saying God told him that he did not need clothing, that he would be given a suit of armor and a crown with a star.

On the fourth day after the onset of the mental disturbance, he became so resistive and antagonistic that it became necessary to place him in confinement. There he was noisy and destructive. On the fifth day he was brought to the hospital. Here he was apprehensive, perplexed and constantly hallucinated. His stream of thought was much interrupted by hallucinations

and blocking. He spoke of spirits bothering him. His mind was troubled all the time. He thought he was not on earth. He rapidly developed a marked emotional let-down and took no interest in anything about him. He stood about in attitudes as if abstracted and often could be observed laughing in a silly manner without provocation.

Aside from poor nutrition there were no serious physical or neurologic abnormalities.

Case 10 (S. P. H. 2590).—Diagnosis: Dementia praecox, simple deterioration (Fig. 2, Curve 3).

C. M., a man, aged 22, was admitted June 3, 1919. The family history was negative. There seemed to have been no serious mental disturbance until

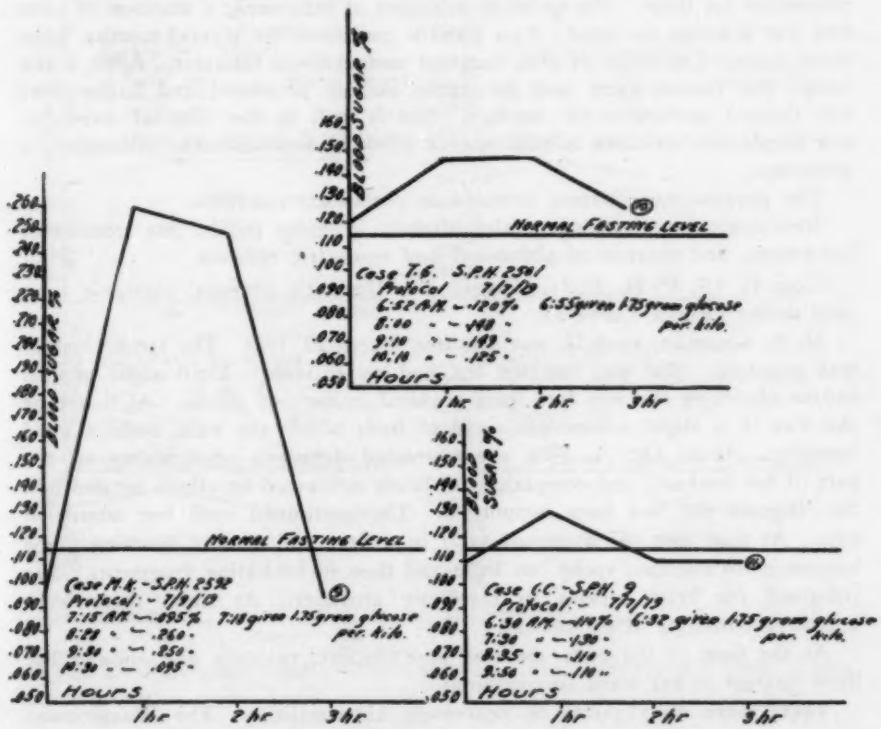

Fig. 4.—Individual sugar tolerance curves in dementia praecox.

his discharge from the army in February, 1919. Following this he became irritable and forgetful. He developed peculiar behavior which led to his commitment to this hospital. Here his attitude was one of marked indifference. He was seclusive, talked but little, and then his replies were superficial and inadequate. He sat about as if abstracted. At times he laughed without provocation. The only delusion that was expressed was in regard to his mother. He denied that she was his mother and became irritable if the subject was discussed. There were no hallucinations while he was under observation.

There were no serious physical or neurologic abnormalities. The Wassermann reaction on the blood was negative.

Case 11 (S. P. H. 2528).—Diagnosis: Dementia praecox, hebephrenic type (Fig. 2, Curve 4).

H. T., a woman, aged 27, was admitted March 14, 1919. She had a bad home environment during childhood. Her parents separated, and her mother was immoral. At the age of 12, she was sent to a state industrial school where she remained until she was 18. After this she was employed at various occupations. At the age of 25 she became nervous and complained of various transitory pains. These continued until the age of 27, when she was sent to a general hospital because of a pain in the inguinal region.

A few days later she became acutely disturbed. She showed extreme perplexity, marked blocking of thought, ambivalence and auditory hallucinations. The content of thought was much taken up with erotic phantasies and self reproaches for these. She spoke of delusions of influences; a machine of some sort was drawing her head. This attitude continued for several months, when there occurred episodes of silly laughter and careless behavior. After a few weeks this passed away and she again became perplexed and hallucinated and showed marked erotic conduct. She is still in the hospital somewhat less perplexed, but there is still evident blocking and numerous schizophrenic symptoms.

The physical examination revealed no pathologic condition.

Neurologic examination revealed slightly irregular pupils, fine tremors of the tongue, and absence of abdominal and epigastric reflexes.

Case 12 (S. P. H. 2538).—Diagnosis: Dementia praecox, catatonic type, mild stupor (Fig. 3, Curve 5).

M. S., a woman, aged 37, was admitted March 29, 1919. The family history was negative. She was married but had no children. Until eight months before admission she was free from physical or nervous illness. At that time she was in a slight automobile accident from which she soon made a good recovery. About Oct. 1, 1918, she expressed delusions of infidelity on the part of her husband, and complained of being influenced by others around her. She thought she had been hypnotized. This continued until her admission here. At that time she appeared as if in a daze and showed blocking. She became more inactive, spoke but little and then in hesitating fragments. She remained for brief periods in cataleptic attitudes. At times there were impulsive outbursts of excitement.

At the time of the tests she was unproductive, resistive and showed but little interest in her ward surroundings.

There were no physical or neurologic abnormalities. The Wassermann reaction of the blood was negative.

Case 13 (S. P. H. 2604).—Diagnosis: Dementia praecox, hebephrenic type (Fig. 3, Curve 6).

A. L., a man, aged 27, was admitted June 22, 1919. The family history was negative. The patient had had a common school education. In September, 1917, he entered an army training camp. In March, 1918, he was sent to France. There he saw a good deal of service at the front, serving part of the time as a litter bearer. In August, 1918, he was gassed and sent to a base hospital where he remained until returned to the United States in April, 1919. He was placed in a hospital at Camp Upton. There he was regarded as mentally disordered and sent to the psychopathic section. The examination there disclosed slow speech and difficulty in thinking. There was some tendency to worry about his family, but in general he was disinterested in his surround-

ings and showed little initiative. In June, 1919, he was sent to Ann Arbor. Here he showed a few abnormalities in appearance. His face had a perplexed and at times somewhat silly expression. In general, he was quiet and inactive. When urged to do a little work, his interest would soon flag and he would stand about until again started at something. His speech showed a number of peculiar mannerisms. In speaking he kept his lips rather tightly closed, and his responses were given in slurring, stuttering tones. The most notable feature of his stream of thought was the poverty of ideas. He spoke in short, choppy sentences. He complained of a drawing sensation in head. He heard his mother's voice telling him not to eat. He obeyed this, but afterward complained of the food tasting bad. At other times, he heard voices telling him pleasant things. He complained of the food hurting him mentally.

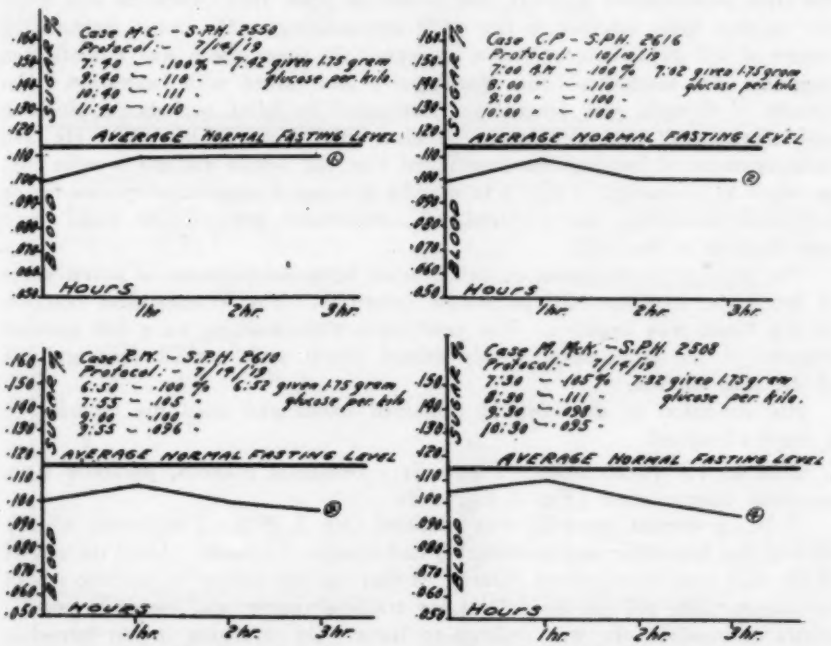

Fig. 5.—Individual sugar tolerance curves in manic-depressive insanity (hypomanic group).

There were no important physical abnormalities. The chief neurologic symptoms were fine tremor of the tongue and fingers, and moderate dermatographia.

His condition continued without change until his discharge to his family on July 13, 1919.

Case 14 (S. P. H. 2600).—Diagnosis: Dementia praecox, hebephrenic type (Fig. 3, Curve 7).

C. B., a man, aged 24, was admitted June 14, 1919.

His father was alcoholic and his mother neurotic. At the present time she has tics and choreiform movements.

At the age of 8 he is said to have had chorea. He was in school until he finished the eighth grade and was considered an average scholar. In temperament he was somewhat shy. At the age of 21, he had a neisserian infection. He worked as an unskilled laborer until June, 1917, when he entered in the

United States Army. The records of U. S. General Hospital No. 1 state that before he entered the Army he had a fear that if he were in action "he would get horribly wounded and suffer a lot." In France, this idea became more pronounced. He was gassed in October, 1918, and badly burned. After this experience he imagined there were holes in his lungs. He spoke of being dead and of having been in hell. He experienced visions in which he saw the devil. On the way back to the United States, he heard God's voice saying, "It's you, it's you." This he interpreted to mean that he was to save the world from a religious war. In General Hospital No. 1, he appeared dull and indifferent. His talk about his early life was fairly clear, but about recent experiences there was a marked incoherence. He laughed without provocation. At times, he was acutely hallucinated. He was transferred to the state psychopathic hospital, Ann Arbor, in June, 1919. Here he was quiet. He showed little interest in his ward surroundings. He never learned the names of his physicians or fellow patients. At times there was unmotivated laughter. He seemed a little apprehensive and talked with hesitation. His stream of thought was frequently interrupted by brief periods of blocking and abstraction. He complained of electricity being in his bed. He had hallucinations of hearing, but mentioned that the voices did not trouble him so much as formerly. There was usually a marked suggestibility, his hands and arms remaining where placed for considerable periods. At times there was flushing of the face.

The physical examination revealed, aside from the presence of a few casts in the urine, no important pathologic condition. The Wassermann reaction on the blood was negative. The neurologic abnormalities were fine general tremors of the extremities, widely dilated pupils and marked dermographia of the skin surface.

His condition in the hospital remained unchanged until his transfer to a district hospital.

Case 15 (S. P. H. 2410).—Diagnosis: Dementia praecox, paranoid type, apathetic deterioration (Fig. 3, Curve 8).

F. W., a woman, aged 20, was admitted Oct. 3, 1918. The family history showed that her father and grandfather had attacks of insanity. Until the age of 18 she was free from serious illness. At that age she entered a training school for nurses. She did not do well in her training course, and owing to peculiarities of conduct, she was ordered to leave. On returning to her home, it was observed that she was irritable, abstracted and forgetful. She expressed delusions of a persecutory type: that her family and others were against her and that she had not been properly cared for. Following this, she was admitted to this hospital Oct. 3, 1918, where her attitude showed a good deal of emotional tension. While she was obedient to the ward routine, she was restless and talkative. She related a long narrative, somewhat confused in detail, but in substance it was that she had been a sensitive, nervous child, who had not been understood by her parents, and this led to her becoming disordered in mind. She spoke of her head as being filled with wrong ideas all jumbled up. Everything that she had ever known was all mixed up. Voices talked to her and she had frightful visions. She appreciated that something was the matter and was glad to come to the hospital. During the further development of her condition in the hospital, she elaborated a phantastic story of having been a child born of noble parentage, who had been stolen away from her rightful home. She gave herself fanciful names and identified the physicians of the hospital by names of people who had played

a part in her various past experiences. There was always a perplexed, uncertain attitude toward what had happened to her and this led to frequent changes in her story. She became irritable when interviewed and kept by herself. She showed a progressive lessening of her interest in things about her. Auditory hallucinations became exceedingly troublesome. There were definite schizophrenic manifestations. She would remark: "Parts of my body become dislocated; sometimes I have blue eyes and sometimes I have black. Strange forms envelop me and control me." In the further development of

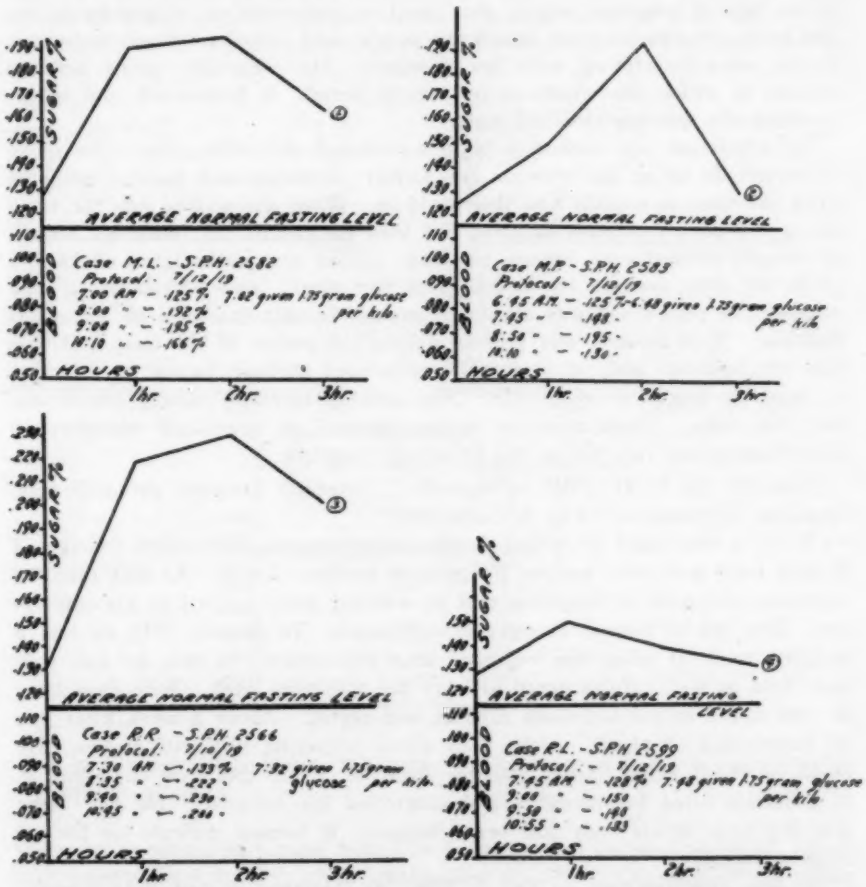

Fig. 6.—Individual sugar tolerance curves in manic-depressive insanity (depressive group).

the disorder her delusions became less coherent. Then developed a marked apathy. She lost all interest in her personal appearance. She kept by herself, lying for long periods of time on a couch or bed without speaking. At other times, she was more active and there were frequent outbursts of silly laughter. At the time of the tests her condition was one of apathetic stupor.

There were no important physical or neurologic abnormalities.

Case 16 (S. P. H. 2592).—Diagnosis: Dementia praecox, catatonic type, negativistic stupor (Fig. 4, Curve 9).

M. K., a woman, aged 38, was admitted June 5, 1919. The family history shows that a sister had been insane. At about the age of 30, she developed an unusual interest in religious matters. Since the age of 34, she has been less efficient in her household work, and for the greater part of the time has been cared for by friends. During this period she expressed numerous somatic complaints of pain and numbness in her hands and body. About three months before admission, she had a brief attack of confusion in which she was disoriented and acted strangely. From then on, there was a more marked mental disorder. She expressed delusions of influence, spoke of the near approach of the day of judgment, saying that she had committed an unpardonable sin. She held conversation with imaginary people, and talked much of hypnotism. People were interfering with her thoughts. Her behavior varied between periods in which she would actively busy herself in housework and others in which she was inactive and mute.

On admission, she seemed to be in a confused, dreamlike state. She spoke of herself as being the wife of her former physician, and became muddled when she tried to explain how this could be. When she walked into the room she would go a few steps forward and then backward. At times her stream of thought showed very definite blocking. About two weeks later, she would sit in the same position for hours. Her feet would become cyanotic. For a considerable period she was absolutely mute. Threats produced no emotional response. This attitude was present during the period of the tests. At this time she held her body in a peculiar stereotyped attitude, paying no attention to anything going on about her. She actively resented passive movements and was mute. There were no serious physical or neurologic disturbances. The Wassermann reaction on the blood was negative.

Case 17 (S. P. H. 2501).—Diagnosis: Dementia praecox, paranoid type, apathetic deterioration (Fig. 4, Curve 10).

T. G., a man, aged 37, whose family history was negative, until the age of 32 had been free from serious physical or nervous illness. At that time, he expressed delusions of suspicion that he was not fairly treated by his employers. This led to several changes of occupation. In August, 1918, he had a sudden attack of what was regarded as a heatstroke. In this, he was pale and "cold as ice." He returned to work the following week. Four days later he was found in his bathroom sobbing and crying. About a week after this he complained of people on the floor above bothering him with noises. He spoke of lights being flashed into his window. From this time on delusions of influence filled his thoughts and controlled his behavior. He had ideas that the form of his body had been changed. It became difficult for him to think coherently.

He was admitted here on Feb. 8, 1919. At that time he had clear comprehension and orientation, but his thought had an ambivalent quality. He expressed delusions of suspicion and reference. Many of his remarks were absurd. He spoke of eating sentences and words. When he bit into his food the sentences said things pertaining to his past life. Sometimes they gave directions as to what he was to do, saying, "Yes, no, yes, no, yes is no and no is yes." Auditory hallucinations were present more or less continuously for the first weeks of his residence. At times there were episodes in which he was negativistic. His delusions were unchanged. There developed rapidly an indifference to the hallucinations. At times there was unmotivated laughter. He usually kept by himself. At the time of the tests he was quiet, inaccessible

and showed little interest in his surroundings, but the delusions remained unchanged.

Physical and neurologic examinations revealed no serious abnormalities.

CASE 18 (S. P. H. 9).—Diagnosis: Dementia praecox, hebephrenic type, mild deterioration with desultory thought and impulsive conduct (Fig. 4, Curve 11).

C. C., a man, aged 26, was admitted Feb. 7, 1906. The family history was negative. At the age of 22, while a student in college, he became unable to study. He complained of his head getting light on the inside, and of being unable to grasp even the simplest ideas. He was removed from school, but continued to show mental peculiarities. He became seclusive and explained his

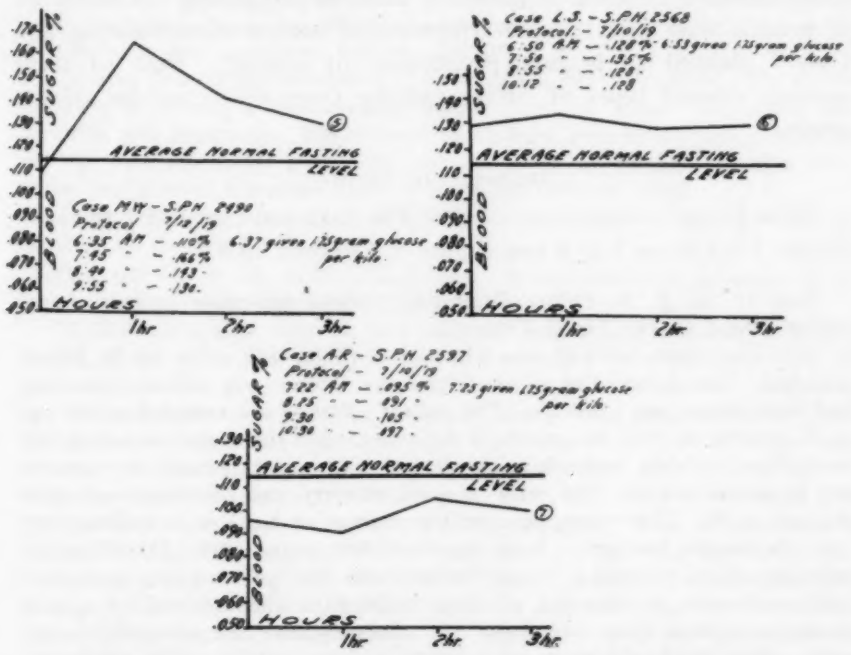

Fig. 7.—Individual sugar tolerance curves in manic-depressive insanity (depressive group).

difficulty at school as having been due to being shot through the head. Several months later, he was given employment in a broker's office. After about six weeks he was dismissed because of the mistakes he made. He was allowed to return to college, but soon disappeared. He went to Chicago where he behaved strangely. He expressed many expansive ideas, declared himself to be a monarch, attempted to interview prominent people, entered a private home and was apprehended by the police. He was placed in a private hospital where he continued to express expansive ideas and often laughed with unknown cause. His conversation became less coherent. He gave wrong names to those around him. This condition continued with little change until 1906 when he was transferred to this hospital. From then until the present time, thirteen years, there has been little change in his condition. He has continued clear in comprehension, orderly in conduct and extremely helpful about

the hospital. He is impulsive and somewhat irritable. At times he betrays a confused content of thought in which are mingled fragments of former delusions and falsifications of realities.

At no time has he shown any serious physical or nervous disorder.

MANIC-DEPRESSIVE GROUP

In this group are included eleven cases. Of these four were quite typically of the hypomanic phase, and Cases 1, 2, 4, 5 and 6 were in the depressed phase. Two cases are included here which probably belong in this group, but yet were somewhat atypical in their clinical symptomatology. Case 3 presented features suggesting the influence of a toxic state with definite symptoms of unclear consciousness, and Case 7 showed an unusual prominence of anxiety. Both of these patients showed types of curves varying from the remainder of the group.

HYPOMANIC GROUP

This group includes four cases. The data and curves are given in Figure 1*B*, Curves 1 to 4 and Figure 5, Curves 1 to 4.

CASE 19 (S. P. H. 2550).—Diagnosis: Manic-depressive insanity, hypomania, second attack (Fig. 5, Curve 1).

M. C., a woman, aged 49, was admitted April 16, 1919. The family history was bad. The father died of apoplexy; one brother was insane, one sister had been insane and a suicide. The patient's first attack occurred at the age of 27, coming on after the suicide of her sister. For six weeks she was mildly overactive, irritable, euphoric in mood and was unable properly to care for her household duties. She made a good recovery and continued well until the age of 49. Then worrying over the absence of her son in military service, she became overactive, wrote numerous letters and busied herself unduly with the affairs of others. Since January, she has had recurring periods of mild excitement, at intervals of about eight days and followed by a mild depression lasting about two days. On admission here she was mildly overactive, talked much, and wrote many letters, and was usually a little exhilarated in mood. Usually she was extremely distractible and her stream of thought often gave definite flights of ideas. Her reactions were characteristically those of a mild hypomania.

There were no important physical or neurologic abnormalities. After three months' treatment, she had improved greatly and returned to her home.

CASE 20 (S. P. H. 2616).—Diagnosis: Manic-depressive insanity, hypomania, with history of several previous attacks (Fig. 5, Curve 2).

C. P., a man, aged 53, was admitted July 11, 1919. The family history was negative. At the age of 37, he had his first attack of mental disorder. At that time he was overactive, sleepless and unable to concentrate his interest on his work. After a few months he regained his normal level. Similar attacks have recurred about every two years, lasting from three to six months. The present attack began in March, 1919. For about three months he was inactive, complained of being tired and slept poorly. This gradually passed into a phase of overactivity with euphoric mood, distractible attention, marked talkativeness and clear comprehension and orientation. In this condition, he

was admitted to this hospital. Here he has been overactive, distractible, boastful, with marked flight of ideas. His mood has been constantly one of elation.

His physical and neurologic examinations showed no serious abnormalities.

CASE 21 (S. P. H. 2610).—Diagnosis: Manic-depressive insanity, hypomania, with marked delusional elaboration (Fig. 5, Curve 3).

R. W., a man, aged 23, was admitted, June 30, 1919. The family history showed environmental difficulties, but no insanity. Following a fracture of the leg at the age of 22, it was observed that his disposition had changed. He was more irritable and quick tempered. Two weeks previous to admission he expressed delusions of persecution and became apprehensive that the police were after him. There progressed from this time an increasing excitement with excessive talkativeness and delusions of reference and persecution. On admission here, he was overactive, irritable and talked much in a boastful way. He was always clear in comprehension. His attention was distractible. The stream of thought showed a characteristic manic flight of ideas. His mood was irritable and expansive. His content of thought was intermixed with ideas of reference and erotic phantasies. At the period of the tests he was overactive and showed a marked flight of ideas and elevated mood.

There were no physical or neurologic abnormalities. The Wassermann reaction on the blood was negative.

CASE 22 (S. P. H. 2508).—Diagnosis: Manic-depressive insanity, hypomania, with paranoid reactions (Fig. 5, Curve 4).

M. McK., a woman, aged 31, was admitted June 28, 1919. Aside from alcoholism of the father, the family history was negative. She was married at 17 and had had five pregnancies. Several of these were premature births and one was a miscarriage. In 1916, a definite change was observed in her mental attitude. She became more irritable and expressed ideas of a paranoid quality. She spoke of herself as having unusual ability and of being able to influence others around her. A few months later, she wrote letters filled with peculiar expressions of profane or religious character. They were written in a hand writing different from the one she usually used. She expressed delusions regarding her neighbors and accused them of impossible sex immoralities. In April, 1919, she had an attack of influenza and following this her mental abnormalities became exaggerated. On admission here she had numerous complaints of physical discomforts. She was restless, talked much, with a tendency toward distractibility. Her mood was usually euphoric with occasional impulsive outbursts of irritability. The content of her thought had a paranoid trend, with ideas of reference and false interpretations of her experience in the hospital. There was no distinct flight of ideas, but her speech reactions had a definite manic quality. There were no hallucinations and aside from occasional remarks showing an ambivalent quality there were no schizophrenic symptoms.

Physically, she had mitral stenosis with regurgitation that was well compensated. The Wassermann reaction of the blood was negative. There were no neurologic abnormalities.

DEPRESSIVE GROUP

This group includes seven cases. Two cases are included here which probably rightly belong here, but yet were somewhat atypical in their clinical symptomatology. Case 3 presented features suggesting

the influence of a toxic factor with definite symptoms of unclear consciousness. Case 7 showed an unusual prominence of anxiety. Both of these cases showed types of curves varying from the remainder of the group. The data and curves are given in Figure 1*C*, Curves 1 to 7, and in Figures 6 to 7, Curves 1 to 7.

Case 23 (S. P. H. 2582).—Diagnosis: Manic-depressive insanity, depressed phase. Emotional depression with psychomotor retardation and mild delusional elaborations (Fig. 1 *C*, Curve 4; Fig. 6, Curve 1)).

M. L., a woman, aged 28, was admitted May 26, 1919. Aside from insanity of a grandparent, the family history shows no definite mental disorder. The patient has always been of a nervous temperament which prevented her from successfully completing her school period. At 23 she married, and for a brief period she had a mild depression. This passed off and she continued in her usual health until December, 1918, when she entered gradually on a period of mental depression. At first, this showed itself in feelings of inadequacy and worry about her domestic responsibilites. There then developed ideas of self-accusation and personal unworthiness, which continued until her admission here. Her attitude then was one of deep depression. She was inactive, moved slowly and spoke only when urged. Her replies were given in low tones and short sentences. At times her content of thought showed delusions of negation. She insisted that she had never attended school; that her father and mother were dead; that those about her were not real people; that the food contained disgusting substances, and that the nurses and physicians did not treat her properly.

There were no serious physical or neurologic abnormalities.

Case 24 (S. P. H. 2583).—Diagnosis: Manic-depressive insanity. Emotional depression with retardation and delusions of unworthiness (Fig. 1 *C*, Curve 1; Fig. 6, Curve 2).

M. P., a woman, aged 36, was admitted May 27, 1919. The family history shows that her grandfather committed suicide. Her mental disorder appeared seven months before admission, when following the death of her brother she became depressed. The death of another brother was accompanied by a deepening of her depression with several serious efforts at suicide. On admission, she was deeply depressed. Her stream of thought was greatly slowed. Her content of thought was one of sadness with ideas of unworthiness. She spoke but little, and there was little spontaneous activity. There were no hallucinations nor evidences of schizophrenic disturbances. There were no serious physical or neurologic abnormalities.

Case 25 (S. P. H. 2566).—Diagnosis: Manic-depressive insanity, atypical depression, with marked prominence of hallucinations, and episodes of unclearness, following influenza (Fig. 1 *C*, Curve 3; Fig. 6, Curve 3).

R. R., a woman, aged 37, was admitted May 5, 1919. The family history was negative. Her early life was unimportant. She was married and had eight children. No mental disorder had been noted until December, 1918, when she had influenza, during which she was delirious. With her physical improvement, her mental disorder disappeared to the extent that she took care of her home for about six weeks, when there occurred a sudden change. She became depressed and inactive; made serious attempts at suicide and threatened to kill her children. On admission, she was confused and stuporous. Her stream of thought was slow, and when fatigued she became confused in her responses.

There was little spontaneous speech. Her attitude continued depressed with marked retardation of the stream of thought until September 12, when she suddenly became excited. There were vivid auditory hallucinations to which she reacted with great irritability. A voice came from the clock threatening her and her children. Since then her excitement has lessened, but the hallucinations have continued. She now holds conversations with these. Her affect toward these is less keen than formerly. At the time of the tests she was clear in her understanding of questions and in orientation. The hallucinations were active and at times there were impulsive outbursts of brief duration provoked by the voices which were calling her vile names.

The physical findings at admission were poor nutrition, blood pressure: systolic, 138; diastolic, 90. The Wassermann reaction on the blood was negative. There was no pathologic condition of the organs of the body. There were no definite neurologic findings.

Case 26 (S. P. H. 2599).—Diagnosis: Manic-depressive insanity, depression with marked retardation (Fig. 1 *C*, Curve 4; Fig. 6, Curve 4).

R. L., a man, aged 30, was admitted July 1, 1919. While a soldier overseas, he developed a mental disorder which brought about his admission to a base hospital. His attitude while there was described as being one of depression. He spoke but little and then in low tones. He was returned to this country and for a brief period was in an army hospital. There he continued to be depressed and unproductive. He was transferred to this hospital on July 1, 1919. Here he was restless, pacing about his room for hours. He rarely spoke in audible tones. He understood questions clearly and obeyed requests correctly. His stream of thought was extremely slow, as if retarded. There were no delusions or hallucinations.

There were no serious physical or neurologic findings and the blood Wassermann reaction was negative.

Case 27 (S. P. H. 2490).—Diagnosis: Manic-depressive insanity, depression of the involution period with hysterical symptoms (Fig. 1 *C*, Curve 5; Fig. 7, Curve 5).

M. W., a woman, aged 45, was admitted Jan. 31, 1919. The family history shows that her mother has had periodically recurring attacks of depression since the menopause. The patient had undergone three surgical operations: one for peroneal repair following the birth of her first child, one for hernia a few years ago, and a third for chronic appendicitis in June, 1918. At that time she had been complaining a good deal of indefinite abdominal pains, which were not relieved by the operation. She became apprehensive about the effect of the operation. She soon expressed delusions of being commanded by the Lord to fast. She refused food for a considerable period of time, and on Jan. 31, 1919, she was admitted to this hospital. She was physically feeble and remained in bed for a number of weeks. Her attitude was characterized by numerous complaints about her physical state. She would not eat because the food stuck in her throat. She was inactive, talked but little and was continuously depressed and worried. She was fed mechanically for a number of days. She expressed a variety of delusions. The food had kerosene in it. The food she ate remained in her stomach. Her bowels did not move. She heard voices talking to her at night; her little girl called to her. She received warnings not to eat. It was wrong for her to eat. By doing this she had brought trouble on her family. In April, her depression was less marked. She was more active and expressed her delusional ideas less frequently. Her

improvement continued with great gain in weight until her discharge in September, 1919. The physical examination revealed subjective feelings of weakness. Her weight was 112 pounds. The most notable abnormality was an extremely rapid heart. The pulse rate was 132. There were no definite murmurs. Her blood pressure was 104 systolic and 86 diastolic. The urine and blood were not pathologic. The Wassermann reaction on the blood was negative. Her menstruation had been irregular for several months. Both pupils were slightly irregular. The conjunctivae were anesthetic. The left epigastric and abdominal reflexes were absent. Her improvement continued with gain in weight until her discharge in September, 1919. While her depression had in a large measure passed away, she was markedly abulic and showed little spontaneous interest in her surroundings.

Case 28 (S. P. H. 2568).—Diagnosis: Manic-depressive insanity, emotional depression with marked retardation (Fig. 1 *C*, Curve 6; Fig. 7, Curve 6).

L. S., a woman, aged 53, was admitted May 9, 1919. The family history was negative. Until ten months previous to admission, she had shown no nervous or mental disorder. At that time she became apprehensive that an herpetic eruption would become cancerous. She worried much over this and consulted many physicians. In spite of their assurances that her fears were needless, she became more depressed. Following the illness of her son, she slept badly and ate but little. While in a private hospital she became apprehensive during an operation in a neighboring room and cut her wrist with a piece of glass. Following this, she had the fear that a clot had formed on her brain as a result of having cut her wrist. She imagined that her features had changed, that she would lose her eye sight, and at night she feared to close her eyes lest she should never see the family again. About March 1, she expressed the delusion that her stomach was so full that she could not eat. There had for some time been developing a gangrenous condition of the great toe. At her admission here, she was deeply depressed and extremely apprehensive. She rarely spoke and remained inactive. There was little productivity of thought. Occasionally she expressed delusions of unworthiness or somatic complaints. She resisted the attentions of nurses and ate only on urging.

She was 5 feet, 1¾ inches in height and weighed 107 pounds. She was poorly nourished and feeble in strength.

There were no serious abnormalities of the body organs. The blood pressure was 150 systolic, and 90 diastolic. The Wassermann reaction on the blood was negative. The urine was not abnormal. The right great toe was gangrenous. This slowly improved during her residence and finally entirely recovered. Aside from tremors of the tongue and hands there were no neurologic findings. There was no improvement in her mental condition and her weight had fallen considerably at the time of her removal from the hospital on Sept. 3, 1919.

Case 29 (S. P. H. 2597).—Diagnosis: Manic-depressive insanity, depression with agitation (Fig. 1 *C*, Curve 7; Fig. 7, Curve 7).

A. R., a woman, aged 32, was admitted June 11, 1919. The family history was negative so far as known. Temperamentally the patient was nervous and easily excited. Feb. 2, 1919, she gave birth to a child. About two weeks later she underwent a laparotomy for some unknown abdominal pathologic condition. Two weeks after this she accidentally fell from a chair and from then on she began to be very anxious concerning herself. Various somatic delusions were expressed. She complained of heart trouble, consumption and various physical

ailments. Her delusions soon took on a religious character. The wrath of God had come upon her. She belonged to the devil. There were numerous self-accusations and ideas of unworthiness. She twice attempted to kill her husband and made one serious attempt upon her own life. On admission here, her mood was one of depression with agitation. While in bed she was restless and picked at her fingers and face. While up she walked restlessly about the ward in a tense anxious manner. Her content of thought was one of ideas of unworthiness and self-accusations for her past conduct.

Physically, there were no serious abnormalities. The blood pressure was 119 systolic, and 78 diastolic. The Wassermann reaction on the blood was negative. The neurologic examination showed dulling of pain appreciation on the anterior surfaces of the body and extremities. The tendon reflexes were somewhat diminished. The fingers on extension were tremulous.

DISCUSSION

Referring to the group of normal curves on the composite chart, we note at a glance that these seven curves are practically parallel throughout. Further, we note that the average initial fasting level is about 0.115 per cent., and that the acme level varies considerably, but in every case the primary level is reached within two hours. The average normal fasting level was established on normal persons, carefully controlled as mentioned above. When so controlled, we find that we get a higher average than when no attention is paid to rest and the general condition of the patient. Nevertheless, we do not mean to establish this as a fixed level. Our primary purpose is to use this more or less arbitrary level as a better means for comparison of the curves. We wish to lay no great stress on the normal initial fasting levels, or the acme to which they arise, but on the other hand, we do wish to emphasize the value of the general shape of the curve and the relative zone, that is, above or below the fasting level, on the chart in which the group falls.

In comparing our curves with those obtained by Kooy,[5] it must be borne in mind that he uses considerably less carbohydrate in his tolerance test than we have. We emphasize the fact that the acme level, which Kooy regards as of much importance, varies a great deal among the normal and still more among the abnormal subjects. Among our cases, the acme level seemed to tell us very little.

Reference to the individual curves and to the composite chart seems to reveal that as a group the manic depressive patients who are in the depressed phase have a suggestion of an initial hyperglycemia. The rise is distinctly more pronounced than in the normal, and the elevation is maintained well beyond the second hour, that is, the tolerance seems definitely delayed. The tolerance curves of these patients, excepting Case 7, which we mentioned as being atypical in its symptoms and course, have a diabetic character, the degree of which varies with the clinical status of the patient. The curve in Case 7 has

similarities to that of the hypomanic group. The symptoms, however, were predominantly those of an extreme degree of depression with great agitation. It was a type of case not uncommonly encountered in which the clinical position is usually placed among the manic-depressive psychoses.

Case 3 was also atypical in its clinical course. Its close association with an infectious disease and the occurrence of a lack of clearness of consciousness and other features characteristic of toxic psychoses, might suggest that it did not belong in this group. There was, however, a persistent depression and a psychomotor retardation rather characteristic of manic-depressive cases. Its curve is of the general type of the other cases of the group, but of far greater height.

The cases in the hypomanic phase showed a tolerance curve that was almost flat, when compared with the cases of any of the other groups including the normal. The initial reading is quite low, in fact, slightly below the normal average.

The curves of the dementia praecox group are strikingly different from those of the others. They show a great variation in their acme levels; yet, the shape of all curves within the group is practically the same. Curves 1 to 7, inclusive, are all practically parallel to one another. All of these patients were in the acute phase. The general shape of the curve differs from the normal in that the initial fasting level is lower, the acme is relatively high, and the return to the primary level takes more than three hours, there being a very definitely delayed tolerance.

Curve 11 of this series is perfectly normal in its height and shape. It is of interest to note that this is a case of about seventeen years' duration. The first two years of the course were characteristically those of an acute phase of dementia praecox. At the end of that time, he reached a very satisfactory adjustment and for the last fifteen years has remained stationary with a very mild degree of deterioration.

Curves 8 and 9 bear the general shape of the others of this group, but the acme is much higher. Clinically, both of these cases stood out from among the others of this group on account of certain special features. In Case 8, there were marked variations in the affective reactions. At times, there were periods of extreme confusion and perplexity with marked disturbance of association, at other times periods of silliness or apathetic stupor. Case 9 was one of catatonia with negativistic stupor.

Curve 10, which also varied from the majority of those of the group, was clinically somewhat different. There had for a long time been no acute manifestations, his attitude being one of quiet apathetic deterioration.

Consideration of the curves reveals at once that the acme level of the curve is of no special diagnostic value. While cases of the dementia praecox group and of the depressed phase of the manic depressive group have the same acme level, there is a striking difference in the shape of the curves of the two groups. It is the general topography of the curve rather than any one point that we consider of differential diagnostic importance among the groups studied. Whether or not all of the variations of these curves can be explained by the emotional reactions of the patients, this in turn being in interrelation with a hypersecretion of epinephrin, thus mobilizing the glycogen of the liver and hence increasing the amount of glucose in the circulatory blood, is an unsettled question. Stewart and Rogoff [7] have proved that asphyxia and narcosis cause hyperglycemia, and that this exists after the suprarenals have been removed, and further, that the glycogen store of the liver is unaltered. To what extent this may have been influenced by other parts of the chromaffin system that may not have been removed is undetermined.

When the curves of this series are analyzed, it is noticeable that many of them have a prolonged acme level far above the normal threshold when sugar appears in the urine, yet in only one case was sugar found in any of the urines of this series. This was in Case 3 of the group of depressions, when the height and duration of the acme level would lead one to anticipate a glycosuria.

CONCLUSIONS

It may be stated on the basis of the data secured in these experiments, employing the Benedict modification of the Lewis-Benedict method for blood sugar, that tolerance curves differ from those obtained in normal individuals, in cases of the hypomanic and depressed phases of manic depressive insanity and in cases of dementia praecox; that among the pathologic groups studied there were striking differences among the different groups; that in each clinical group, the curves had features in common that suggest a type curve; that among cases of dementia praecox, tolerance curves vary according to the phase of the clinical course.

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THE SEROLOGY OF THE SPINAL FLUID AND BLOOD IN EPIDEMIC ENCEPHALITIS *

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The subject matter which we present has, for the sake of clearness, been divided into three parts; the first contains a review of the literature, the second, data based on the 245 case reports obtained from the foregoing sources, and the third, a section devoted to differential diagnosis by means of the blood and spinal fluid serology.

REVIEW OF THE LITERATURE

Until the publication, in 1917, of the description of the first cases of epidemic encephalitis in Vienna, no reliable statistics of the changes in the blood and spinal fluid in this disease are obtainable. At this time, von Economo [1] gave an account of the clinical and laboratory findings which we shall consider the first accurate data on the subject. He pointed out the following changes in the spinal fluid: An excess of globulin was found and the spinal fluid cell counts ranged from normal to 43. The fluid was clear and, in some cases, under pressure. The only group of observations which were not mentioned by von Economo concerned changes in the quantity of sugar in the spinal fluid. His observations on the colloidal gold curve were summed up in a sentence. No curves were given. In this country, curves were first published by Josephine B. Neal [2] in September, 1919. She mentioned the abnormal changes and the similarity to those curves found in acute anterior poliomyelitis. Following this, observations on the occurrence of syph-

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* Read in abstract before the Annual Meeting of the Association for Research in Nervous and Mental Diseases, held in New York, Dec. 29, 1920.

* The material for this article was obtained from records of certain New York Hospitals: Bellevue, Mt. Sinai, The Neurological Institute, New York, Presbyterian, Roosevelt and St. Luke's, and from the following physicians: James B. Ayer, Boston; Lewellys F. Barker, Baltimore; Peter Bassoe, Chicago; Josephine B. Neal, New York; Harry C. Solomon, Boston; Walter F. Schaller, San Francisco; E. W. Taylor, Boston, and Lloyd J. Thompson, Boston.

We are extremely grateful to the chiefs of service of these hospitals and to the individual physicians who have sent us copies of their records.

1. Von Economo: Encephalitis Lethargica, Wein. klin. Wchnschr. **30**: 581, 1917.

2. Neal, Josephine B.: Lethargic Encephalitis, Arch. Neurol. & Psychiat. **2**:271 (Sept.) 1919.

ilitic and paretic types of curves were made by Bassoe,[3] Brill and Benson,[4] Davis and Kraus,[5] and Archambault.[6]

The foregoing gives an idea of the chronological order of the description of the spinal fluid findings. The following paragraphs will be devoted to a detailed account of the spinal fluid and blood findings given in the literature.

A. Spinal Fluid: *Appearance.*—In the greatest majority of cases, observation records a clear, colorless fluid. Bloody fluids have occasionally been found, in fact more commonly than could be accounted for by the puncture of a vein. A xanthochromic appearance has been extremely rare.

Pressure.—The pressure of the spinal fluid varies from normal to a considerable increase.

Cell Counts.—In spite of the fact that von Economo in his original description made note of a pleocytosis, the French, who had studied the matter carefully during the years 1918-1919, had come to the conclusion that a normal cell count was a rule and of diagnostic importance. It was not until Dec. 10, 1919, when Bénard[7] reported a case with pleocytosis, that doubt was thrown on the invariability of normal spinal fluid cellular content in epidemic encephalitis. The absence of pleocytosis before this date, as noted by the French, was not found by the British and American observers. The latter published cases seen in 1919, in which there appeared more than the normal number of cells. The cells which appeared in the spinal fluid were always predominantly of the mononuclear type although polymorphonuclear increase up to 15 per cent. had been found in many cases.

The impression gathered from the literature is that the number of cells may vary from normal to an increase of several hundred.

Globulin.—The discrepancy between the report of the French, who noted an absence of globulin in the early cases of the epidemic, and the English and Americans who had reported its presence in increased

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3. Bassoe, P.: Epidemic Encephalitis (Nona), J. A. M. A. **72**:971 (April 5) 1919.

4. Brill and Benson: Lange Reaction in Epidemic Encephalitis, J. Lab. & Clin. Med. **5**:113 (June 20) 1920.

5. Davis and Kraus: The Colloidal Gold Curve in Epidemic Encephalitis, Am. J. Med. Sc. **161**:109, 1921.

6. Archambault, La Salle: Choreo-Athetoid and Choreopsychotic Syndromes as Clinical Types or Sequelae of Epidemic Encephalitis, Arch. Neurol. & Psychiat. **4**:484 (Nov.) 1920.

7. Bénard, R.: Le liquide cephalo-rachidien dans l'encephalite léthargique, Paris méd. **10**:474 (June 5) 1920. (This article contains a thorough review of the French literature up to June, 1920. References from the literature of other countries are also given.)

amounts, is a parallel to the reports on the cell counts. In general, it may be said that an increase in globulin occurs in the majority of cases.

Sugar.—No report of the amount of this substance was made until the end of 1919. From that time until the present, the French have published fifteen observations on the amount of this substance in the spinal fluid. These varied from 0.067 per cent. to 0.106 per cent, averaging 0.085 per cent. It would seem, therefore, that the amount of sugar in the spinal fluid, wherever it has been reported, has exceeded the normal quantity.

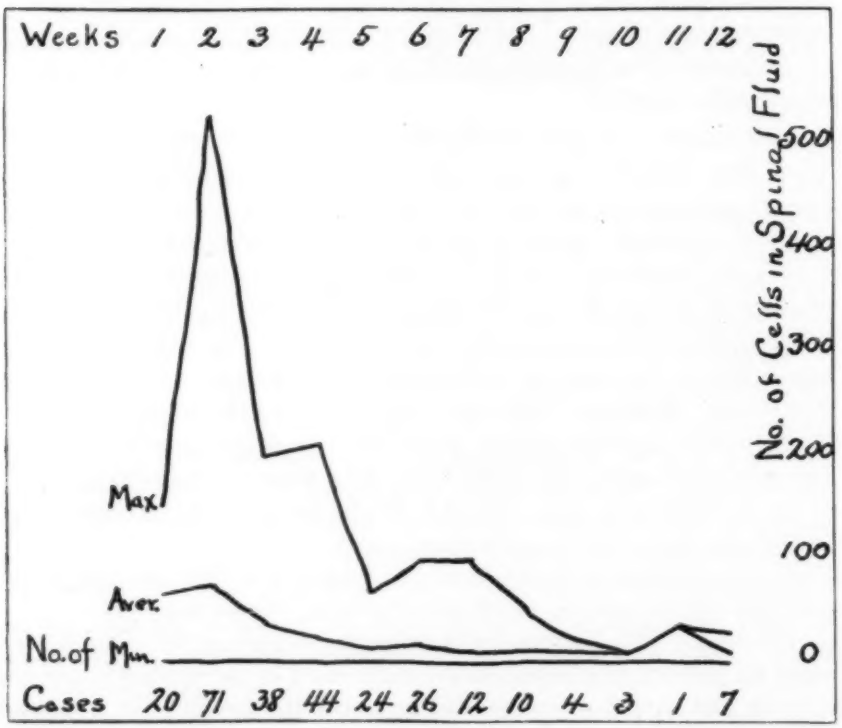

Chart 1.—Variation in the number of cells in the spinal fluid.

Wassermann Reaction.—This has been found negative in the spinal fluid whenever it has been reported except in syphilitic cases.

Colloidal Gold Reaction.—Von Economo [1] commented briefly on the reaction of colloidal gold solutions as follows: "The gold-solution reaction shows no typical elevation of its curves." This implies that some changes existed.

B. Blood: The white blood counts, as reported in the literature, reveal a variation from 3,000 to 25,000, the average being about 15,000. Slight polymorphonuclear increase is the rule. The remainder of the

blood picture is normal. Observations on the blood chemistry have been scattered and incomplete. The blood Wasserman reaction is reported negative.

THE EVIDENCE OF CASE REPORTS

The general statistics in Table 1 give a numerical summing-up of the case reports on which we base our data.

TABLE 1.—NUMERICAL SUMMING UP OF CASE REPORTS

Number of cases	245
Number of spinal fluid cell counts	260
Number of spinal fluid globulin determinations	214
Number of spinal fluid sugar determinations	12
Number of spinal fluid colloidal gold curves	120
Number of spinal fluid Wassermann tests	185
Number of blood Wassermann tests	161
Number of blood polymorphonuclear counts	171
Number of blood differential counts	153

A. SPINAL FLUID: As a rule, the spinal fluid shows considerable and important changes in epidemic encephalitis. These are extremely variable, not only in different cases, but also in the course of each case. The most characteristic changes are:

1. A clear, colorless fluid.
2. With an increase in the pressure of the cerebrospinal fluid when withdrawn.
3. An increase in the number of mononuclear cells.
4. An increase in the amount of globulin.
5. An increased amount of spinal fluid sugar.
6. A negative Wassermann reaction.
7. The presence of bodies producing a change in the color of a solution of colloidal gold (Lange reaction).

1. *Appearance.*—The fluid is, in most cases, clear and colorless. Occasionally bloody fluid is obtained.

2. *The Pressure.*—As would be expected, the pressure of the spinal fluid is sometimes very much increased. Here also no rule exists, and, though this hypertension is frequent, it is not universal.

3. *The Cell Count.*—Table 2 indicates the minimum, maximum and average number of cells during each of the first twelve weeks and during the fourth to twenty-fourth months of the disease. The graph in Chart 1 presents this in a different way. It may be seen that, on the average, more cells are found during the first three weeks of the disease. The value of this in individual cases is diminished by the variations in the number of cells in each week. An idea of this may be had from an examination of the columns showing maximum and minimum number of cells for each week and from Table 3. The number of polymorphonuclear cells may be as great as 15 per cent.

Fluctuation in the number of cells occurs during the course of the disease. When there is a remission, the cell counts may increase.

4. *Globulin.*—The globulin is usually increased to a moderate degree (in 72 per cent. of the cases). However, since this is not always true, its diagnostic value in individual cases is lessened. The presence of globulin is not always paralleled by the presence of cells or a positive colloidal gold curve.

5. *The Sugar Test.*—The majority of the tests have been done at Bellevue Hospital since May, 1920. No estimates were given in case reports outside of New York.

TABLE 2.—NUMBER OF CELLS IN THE SPINAL FLUID

Weeks	Minimum	Average	Maximum	Cases
1	2.0	63.3	160.0	20
2	0.0	71.0	540.0	71
3	0.0	37.3	200.0	38
4	0.0	28.2	222.0	44
5	1.0	21.3	70.0	24
6	0.0	25.7	100.0	26
7	1.0	21.0	101.0	12
8	2.0	16.2	48.0	10
9	0.0	13.0	32.0	4
10	5.0	8.0	14.0	3
11	4.0	40.0	40.0	1
12	2.0	15.2	33.0	7
Months				
4	4.0	40.2	108.0	9
5				
6	3.0	32.0	61.0	2
7		2.0		1
8	2.0	2.5	3.0	2
9				
10				
11				
12				
13				
21		2.0		1
24		3.0		1

The number of estimations is insufficient to enable us to draw any but tentative conclusions. However, those figures which we have show, without exception, values above normal.

The sugar content of the spinal fluid has been tested in twelve cases. It has ranged from 0.062 per cent. to 0.095 per cent. (Table 4).

6. *The Wassermann Test.*—This was negative when reported.

7. *The Colloidal Gold Curve.*—This has been found changed in 100 out of 120 cases (83 per cent.). The type of curve varies considerably, as Chart 2 shows. There is a tendency toward elevation of the left-hand part of the curves in the later stages of the disease, but this is not constant. Positive curves were found as late as the twenty-first month. Elevations of the right end of the curve alone were not found.

TABLE 3.—Number of Cells in the Spinal Fluids at Various Weeks Including Repetition of Cell Counts *

1	2	3	4	5	6	7	8	9	10	11	12
4	—	—	5	—	—	—	—	2			
100	—	—	—	—	—	—	15				
70	30	—	—	60	70						
100	—	—	—	—	8						
5	10	—	5								
3	—	20									
40	—	4									
50	—	4									
160	90										
160	64										
2											
5	21	38	28	20	—	—	15				
5	8	10	—	8							
9	{180}	—	—	45							
11	{350}										
25	19	18	32								
26	100	40	40								
120	{130}	—	26								
150	{540}										
150	270	—	149								
	{15}	25									
	{22}										
	6	20									
	7	7									
	16	18									
	{22}	{16}									
	{36}	{43}									
	37	7									
	44	2									
		12									
	46	6									
	150	200									
	4	6									
	0										
	0	100	—	—	—	—	18				
	3										
	4										
	4	0									
	5	0	0	—	—	—	2				
	5	2	0	—	12	—	8				
	7	5	150	—	13						
	7	6	20	15							
	10	10	5	10							
	10	12	43	{19}							
	12	114		{36}							
	12	18									
	12	18									
	14	20	0								
	18	30	0	3	—	3					
	20	31	6	30	—	6					
	20	48	6	30	{40}						
	122	{50}	6		{42}						
	25	{75}	6		{46}						
	27	60	6		{57}						
	29	104	7								
	{30}	134	{8}	1							
	{100}	170	{11}	4	97	—	—	—	—	—	32
	30		{8}	4	48	14	14				
	30		{15}	5							
	43		9	8	0						
	45		9	9	0	3	—	—	5		
	50		{10}	15	0	22	—	—	14		
	{54}		{66}	16	0	30	48	32			
	{160}		{78}	16	{2}						
	56		11	21	{11}	1					
	70		15	28	{12}	3	10	—	5		
	71		18	40	4	11					
	72		24	70	5	28	2				
	80		25		7	30	30	0	No observation		
	103		28		13	101		5			
	{190}		30		100						
	{230}		30							40	{2}
	200		35								{6}
	270		35								{11}
	650		40								{18}
			66								
			95								11
			222								27

Months						
4	5	6	7	8	21	24
4	{3}	3	2	2	2	3
6	{5}	61		3		—
7	{9}	—	—		—	
10	5			—		
14	5					
15	8					
98	22					
100	—					
108						

* Except where repetitions occur, the figures are arranged in an ascending order. Bracketed figures indicate several observations on the same case and in the same week.

The tendency is to a color change in the high and medium concentrations of spinal fluid. Changes in the low concentrations do not occur alone, but may occur when the medium and the high concentrations are altered.

B. Blood: Normal values for red blood count and hemoglobin have invariably been found. Leukocyte counts have varied from a minimum of 4,500 to a maximum of 32,000, the general average being 12,000. Chart 3 shows these relations in graphic form.

TABLE 4.—Sugar Content of Spinal Fluid in Twelve Cases

Week	Month	Percentage of Sugar in the Cerebrospinal Fluid
3	..	0.082
3	..	0.075
6	..	0.068
9	..	0.062
9	..	0.094
..	4	0.065
..	4	0.080
..	4	0.094
..	4	0.092 *
..	5	0.070 *
..	5	0.063
..	10	0.095

* Observations on the same case.

Maximum, minimum and average percentage of polymorphonuclears are shown in the graph in Chart 4. This will serve to emphasize the extent of the variations in the various stages of the disease.

The number of observations on the chemistry of the blood are too few to enable us to draw any conclusions.

TABLE 5.—Percentage of Sugar in the Blood in Twelve Cases

Week	Month	Percentage of Sugar in the Blood
2	..	0.095
2	..	0.75
3	..	0.100
3	..	0.100
3	..	0.111
3	..	0.083
4	..	0.120
7	..	0.100
..	4	0.110 *
..	5	0.170 *
..	6	0.143
..	7	0.101

* Observations on the same case.

A few observations (12) on the amount of sugar in the blood have been recorded and are within normal limits. They are recorded in Table 5.

Wassermann Reaction.—The Wassermann reaction has been found negative when reported.

DIFFERENTIAL DIAGNOSIS

1. Other Forms of Meningitis: (*a*) serous, (*b*) acute purulent, (*c*) tuberculous, (*d*) syphilitic meningitis and neurosyphilis.
2. Acute Anterior Poliomyelitis.
3. Brain Tumor.
4. Parkinson's Syndromes and Allied Conditions.

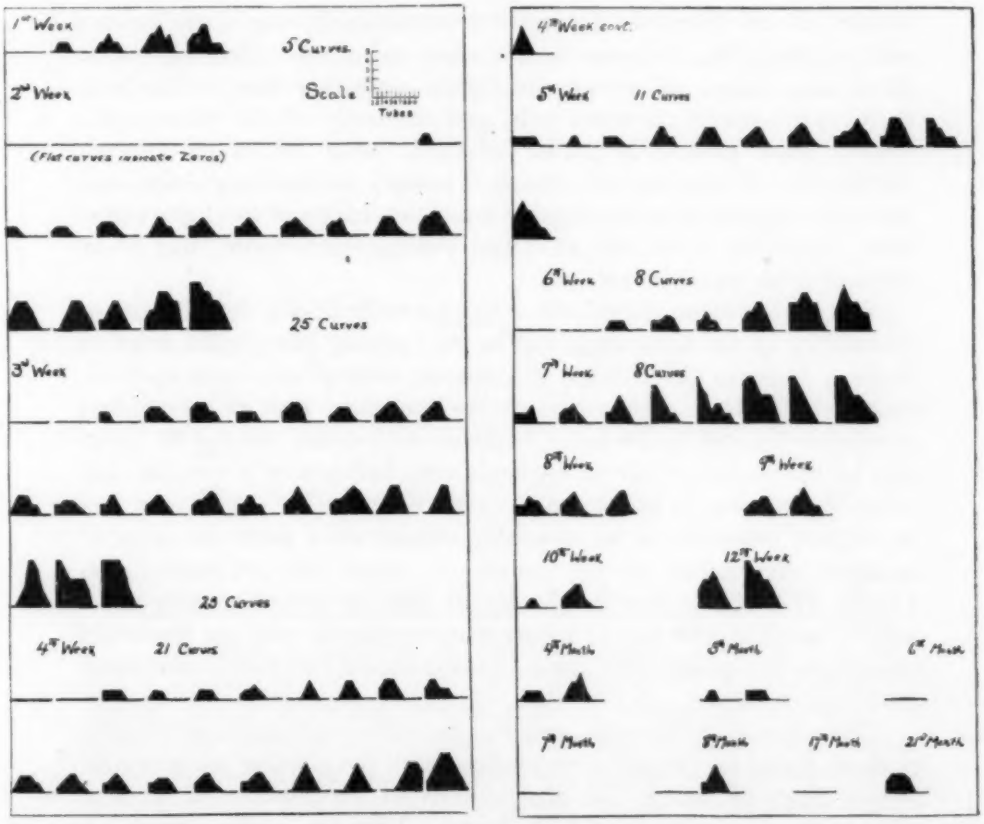

Chart 2.—Colloidal gold curves.

5. Multiple Sclerosis.
6. Polyneuritis.

In order to use the serology of the spinal fluid in epidemic encephalitis for the purpose of differential diagnosis, it is necessary to make observations on the pressure, the cell count, the globulin, the presence of sugar, the colloidal gold curve and the Wasserman reaction. When

these observations give no conclusive evidence, a quantitative estimate of the sugar of the spinal fluid should be made.

The various examinations mentioned will, in the majority of instances, serve to differentiate epidemic encephalitis from other diseases clinically similar. Certain diseases, as will be emphasized in the following paragraphs, cannot be differentiated by all of these means.

1. MENINGITIS: (*a*) *Serous Type (Meningismus).*—The cells and globulin in this disease show no deviation from the normal, but the pressure is always increased. These facts do not serve as a differential point for there are some cases of encephalitis in which the picture is the same.

(*b*) *Acute Purulent Meningitis.*—In the early stages, the marked polymorphonuclear increase is the most important differential point. In the later stages, the presence of cloudy opalescent fluid, with cellular increase of several thousand cells, predominantly of the polymorphonuclear type, present a picture which is never found in epidemic encephalitis. The quantitative sugar is usually increased or absent, and the colloidal gold solution may show a color change in the higher dilutions (right end of the curve). Bacteriologic examination may reveal organisms by smear or culture.

(*c*) *Tuberculous Meningitis.*—Examination of the spinal fluid, as thoroughly as has been suggested in the opening paragraphs, must be made in order to differentiate this disease serologically from epidemic encephalitis. It is emphasized in the literature that in tuberculous meningitis the cell count has a tendency to increase during the progress of the disease, while in epidemic encephalitis this is not the case. This observation, in our opinion, is of considerable importance, but we do not believe it to be invariably correct since there are cases of epidemic encephalitis in the course of which the cell count rises (Table 3). The picture of the spinal fluid in epidemic encephalitis may be identical with that of tuberculous meningitis with one important exception—the quantitative sugar. This is almost invariably diminished in the latter disease.

The colloidal gold curves seen in tuberculous meningitis are similar to those found in epidemic encephalitis, with the possible exception of paretic types of curves. No observations on the presence of these in tuberculous meningitis have been found. They are fairly common in cases of epidemic encephalitis.

(*d*) *Neurosyphilis and Syphilitic Meningitis.*—Epidemic encephalitis may be ruled out by a positive Wassermann reaction in the blood or spinal fluid, except in the rare coincidences of the two diseases. In such cases no differentiating point can be made. Cases in which the Wassermann reaction is not positive in the spinal fluid findings are also of no value when the history or clinical findings are clearly indicative of syphilis.

2. Poliomyelitis: This disease presents a picture which cannot be differentiated (at the present state of our knowledge) from epidemic encephalitis, in so far as the spinal fluid is concerned. Further researches on immunologic tests and quantitative sugar estimation on the spinal fluid may yield data of differential diagnostic importance.

3. Brain Tumor: The presence of a high cell count is of extreme rarity in brain tumor; other than this there are no differential points in the diagnosis from epidemic encephalitis, in so far as the spinal fluid is concerned. In brain abscess, a mild pleocytosis, usually of polymorphonuclear cells, is often found.

4. Parkinsonian and Allied Conditions: Since the occurrence of the recent epidemic of encephalitis, this group must be divided into two parts: those caused by encephalitis and those not caused by this

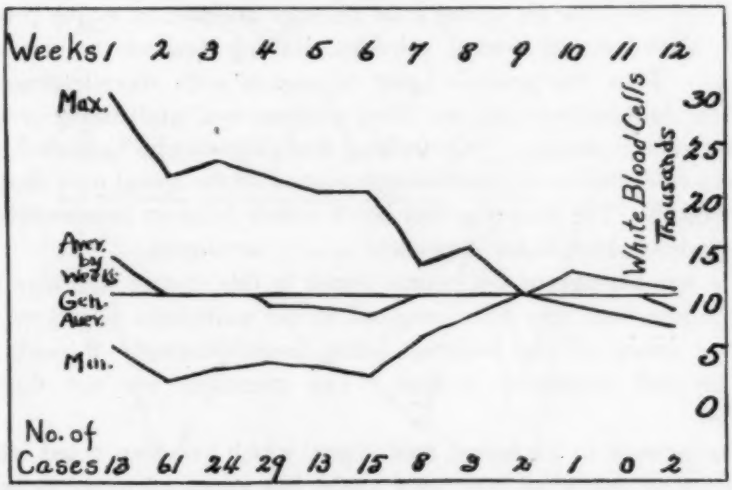

Chart 3.—Variation in leukocyte counts in the blood.

disease. In the acute and chronic stages of both of these groups, the spinal fluid findings are of great differential diagnostic importance. When the condition is due to encephalitis, several or all of the findings described in the foregoing may be found. When in this group a positive Wassermann reaction is found, the history of the case will decide the diagnosis rather than the spinal fluid findings, and the probability is that the case is due to syphilis. The parkinsonian syndrome may be on a syphilitic basis. When the condition is not due to encephalitis or syphilis, the spinal fluid is negative.

5. Multiple Sclerosis: The differential diagnosis between this disease and epidemic encephalitis is, in our opinion, as far as the spinal fluid is concerned, not possible.

6. POLYNEURITIS: As there are no changes in the serology of the fluid in polyneuritis, while in most cases of epidemic encephalitis some change is found, this fact will serve as a differential point.

CONCLUSIONS

The spinal fluid findings in epidemic encephalitis have led us to certain general conclusions in regard to the nature of the disease.

The course of the disease, as illustrated by the serology of the spinal fluid, is extremely variable. A mild insidious or chronic type lasting for months exists, as is shown by the continuation of abnormal changes in the spinal fluid over long periods of time. An acute, fulminating type also exists and may or may not show serologic changes in the spinal fluid. Midway between these two extreme types of the disease is a combination of the acute, fulminating and chronic insidious types. In this type the spinal fluid findings indicate an active process which, after several weeks, subsides, leaving few or no serologic changes. Then the process lights up again with recrudescence of abnormal fluid findings, and may then continue to a fatal ending or what appears to be a recovery. It is striking that patients who have died have not, as a rule, shown any marked aggravation of the spinal fluid changes before death. The reason is that death occurs from an involvement of vital centers, which is not dependent upon a meningitis.

The low average of cell counts found in this disease indicates that the meninges are very little involved in the pathologic processes, the point of attack of the infection being predominatingly through the vascular and lymphatic systems. The meninges are not directly attacked.

The increase in the spinal fluid sugar, which has been noted whenever tests of this kind have been made, has appeared to us to be of great interest. This has been attributed to an involvement of the center of Claude Bernard in the floor of the fourth ventricle. However, it has also been shown by Aschner [8] that "puncture of the floor of the third ventricle causes intense glycosuria." This arouses doubt in our minds as to the validity of the hypothesis that the hyperglycorrhagia is necessarily due to a lesion of the fourth ventricle.

Furthermore, we have been impressed by the lack of correspondence between the amount of spinal fluid sugar, which is always increased, and the amount of blood sugar, which is never increased (Tables 4 and 5). This leads to an hypothesis which must be considered in

8. Aschner, B.: Zur Physiologie des Zwischenhirns, Wien. klin. Wchnschr. **25**:1042, 1912. Quoted from H. Higier: Vegetative Neurology, Nerv. & Ment. Dis., Monograph Series, No. 27, p. 35, 1919.

seeking an explanation for the quantitative sugar changes. The pathologic picture of epidemic encephalitis is essentially one of the blood vessels and the perivascular spaces. It seems possible that the thin membrane of cells, which normally retains within the blood a greater amount of sugar (0.80 per cent. to 0.120 per cent.) than that of the spinal fluid (0.040 per cent. to 0.060 per cent.) may, by being injured, permit the amount of sugar in the spinal fluid to approach that of the blood.

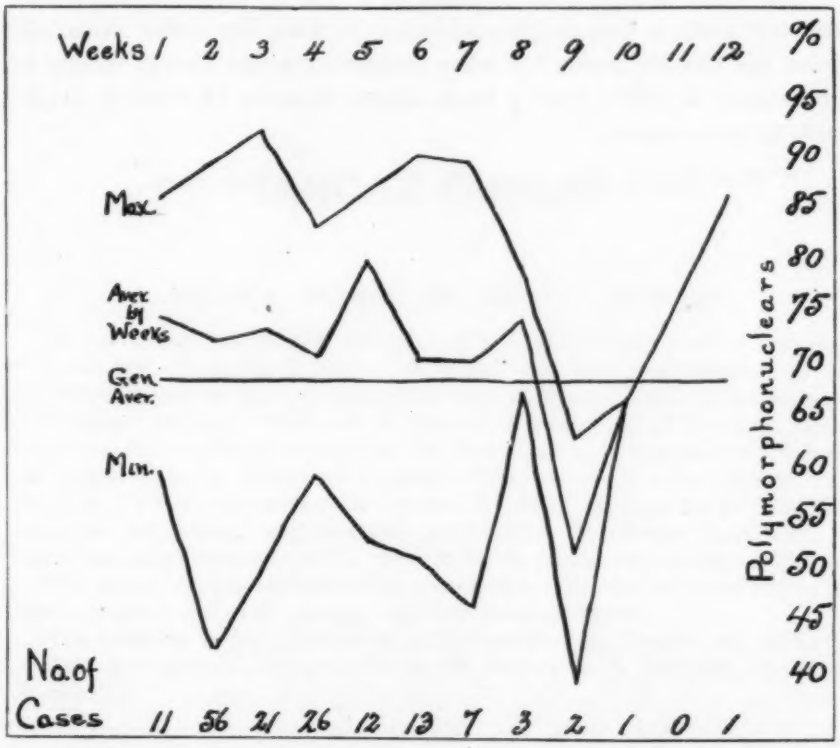

Chart 4.—Variation in numbers of polymorphonuclears in the blood.

The occurrence of rapid emaciation during the encephalitic process and of marked adiposity after it strongly suggests metabolic disturbances dependent on endocrine dysfunction. We believe that the observations on the relations of striate lesions to creatinism, the presence of cirrhosis of the liver in progressive lenticular degeneration (Wilson's syndrome), and of genital dystrophy, similar to Fröhlich's syndrome, occurring in midbrain lesions, are of great importance from both a theoretic and, perhaps, a clinical point of view. A hypothalamic-vegetative nervous system—endocrine connection, seems possible. We should like to urge an investigation of the basal metabolism as well as chemical

blood examinations in cases of epidemic encephalitis in the hope of obtaining more definite data on this very little considered subject.

The diagnostic value of the spinal fluid findings in epidemic encephalitis is mentioned in detail in the section on differential diagnosis. The combination of an increase of cells, globulin and sugar with changes in the colloidal gold curve constitutes a tetrad of laboratory findings of diagnostic importance. Findings other than these are not of diagnostic importance unless related to the clinical findings.

The blood picture gives evidence of a type of infection which does not call forth a polymorphonucleosis. It does not differ essentially from the picture shown by other similar toxemias and is mostly of importance in differentiating from organic diseases of nontoxic origin, such as brain tumor.

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News and Comment

A FRENCH LEAGUE OF MENTAL HYGIENE

In April, 1920, the French Minister of Hygiene and Prevention instituted a Committee of Mental Hygiene. This has now been supplemented by an unofficial League of Mental Prophylaxis and Hygiene (Ligue de prophylaxie et d'hygiene mentale) which will be devoted to a study of all questions relating to mental health as it concerns the individual and communities. Indeed, the activities of the league as outlined will cover much wider ground than our own National Committee for Mental Hygiene. It proposes to open dispensaries for rational and harmless psychopaths, to influence legislation, to direct and assist research and to institute active propaganda among all classes.

The league desires affiliation and cooperation with similar organizations in other countries and will welcome inquiries and suggestions.

The president is Dr. Antheaume, a distinguished psychiatrist and publicist, and the secretary is Dr. Genil-Perrin, 99 Avenue de la Bourdonnais, Paris, France.

Abstracts from Current Literature

THE CHOROID PLEXUS IN ORGANIC DISEASES OF THE BRAIN AND IN SCHIZOPHRENIA. SADAMI KITABAYASHI, Schweiz. Arch. f. Neurol. u. Psychiat. **7**:1, 1921.

The author introduces his subject by referring to the work done in investigating the glands of inner secretion in diseases of the brain, noting especially Mott's and his pupils' results in dementia praecox and the relations found between mental disturbances (apathy, weakness, dulness, etc.) and diseases of the pituitary and suprarenal glands. The choroid, on the other hand, has received little attention either through careful anatomic or clinical study so that the physiological importance and function of the choroid plexus is still little known, and it is only recently that some authors tend to consider it a body related to the glands of inner secretion.

The author's material was taken from three groups:

1. Choroid plexus from persons without psychosis dying from different diseases of the internal organs. In this group were included: (*a*) a child of 11 months, (*b*) a 10-year old boy (dying from perityphlitic abscess), (*c*) a 30-year old woman (tuberculosis), (*d*) a 35-year old man (lethargic encephalitis), and (*e*) a 55-year old man (cause of death, fracture and dislocation of hip with following pneumonia).

2. Choroid plexus from nonschizophrenic subjects suffering from chronic diffuse or focal lesions of the nervous system, in all eight cases falling into two subdivisions:

(*a*) Patients without delirium, among which were included one case each of general paralysis of the insane, chronic internal hydrocephalus and brain tumor (Cases 6, 7 and 8).

(*b*) Cases in which delirium was a prominent symptom, one each of senile dementia, arteriosclerosic dementia, and manic depressive insanity, idiocy with deafness and dumbness, and alcoholism with trauma (Cases 9, 10, 11, 12 and 13).

3. Plexus from schizophrenics. Eight cases were studied in which six patients died from somatic diseases (four cases influenza, one carcinoma ventriculi, one tuberculosis; Cases 14, 15, 16, 17, 18, 19, 20 and 21).

For purposes of study large blocks were taken from the fourth and lateral ventricles and to a lesser extent from the third ventricle, in each case removing a good sized portion of the ventricle wall so that the plexus could be studied in place and in connection with alterations in the adjacent tissues. Most of this material was embedded in celloidin and cut in serial sections of 15 m. Some paraffin sections were made when extreme thinness was desired.

The stains used were Nissl's toluidin blue, Van Giesson, hematoxylin.

The normal structure of the choroid plexus differs considerably in youth and later years. A typical normal plexus in childhood contains little connective tissue between the secreting cells. The cells are round and practically never vacuolated. No colloid masses, or chalky deposits or other foreign deposits are seen and no hyalin shrinking is seen at the top of the folia. Myeloid bodies are rarely seen. Little, if any, difference is observed in the plexus from the

different ventricles. In adult life (30 years in tuberculosis) slight changes are seen which are more marked in the man of 35 years in which some deeply staining bodies are seen; while in the presenile years (55-year old man) chalky concretions are seen, and the connective tissue is more or less atrophied or proliferated. The plasma and nuclei of the cells are almost normal. The ependyma and subependymal tissue is also almost normal.

GROUP 2: Severe organic disease of the brain with and without marked psychosis. In this group more or less marked alterations are seen in the choroid plexus in each case.

In Case 6—an agenetic brain with severe internal hydrocephalus—there is microplexia and atrophy of the folia cells (probably from pressure?), also many albuminoid bodies between the folia (which the author considers due to the illness from which the child died). The ependyma also shows both atrophy and proliferation, and there was proliferation of the subependymal tissue. The pericapillary connective tissue in accordance with the early age, was slight in amount.

The patient in Case 7 was a taboparalytic, who died in status epilepticus. The plexus showed no characteristic changes. The secreting cells were somewhat swollen and slightly vacuolated. There was also some exudate between the folia and on the ependyma, of a fibrinous character, but no formed bodies (Schollen). Such an exudate is seen frequently in patients with high fever, and is here attributed to the status epilepticus.

The patient in Case 8 had an angiosarcoma of the left gyrus fornicatus, corpus callosum, etc. The plexus showed much proliferation of the connective tissue in the perivascular and pericapillary spaces, hyaline degeneration and sclerosis of the secreting cells; between the folia red blood cells, lymphocytes and albuminoid bodies were seen.

The patient in Case 9 was a senile dement, 72 years of age, and showed changes of the plexus customary in advanced age: connective tissue proliferation and presence of chalky bodies, also severe degeneration of the secreting cells, which is not a part of the senile picture. The cells were swollen and had ameboid projections and were partly vacuolated, sclerosed or desquamated. The exudate between the folia also contained albuminoid bodies, and these bodies could be followed also into the subependymal tissue.

The manic-depressive patient in Case 10, 65 years of age, showed severe degeneration of the secreting cells, small nuclei, sclerosis of the cells, desquamation of whole rows of cells, homogenous degeneration of rows of cells and masses of concrement in the folia. Albuminoid bodies were also seen in the folia and could be followed into the subependymal tissues.

The 47-year old man in Case 11 suffered with chronic alcoholism, traumatic section of the spinal cord, hallucinations, ideas of persecution, unclearness and disorientation. Vascular changes were most notable in this case, the walls of both arterioles and capillaries showing hyaline degeneration; thrombi appeared in the capillaries. Extravasation of blood was seen around the arterioles. Many of the secreting cells showed vacuolization; some were atrophied, others sclerosed, swollen or desquamated.

An arteriosclerotic patient of 70 years, in Case 12, showed thickening, sclerosis, serpentining, narrowing and thrombosis of the arterioles with proliferation of the endothelia. The perivascular spaces were enormously enlarged and showed thick proliferation of the connective tissue. Single secreting cells or whole rows together were desquamated, and sclerosis and swelling of the

cells were seen. Albuminoid and amyloid bodies were present between the folia. The ependyma was seldom intact, and albuminoid bodies were seen in the subependymal spaces.

The patient in Case 13 was a deaf and dumb idiot, 53 years of age. The choroid plexus showed a medium grade of mass atrophy of the folia. The individual folia were mostly very small, sometimes sclerosed or swollen and often desquamated. Connective tissue proliferation was present and colloid and chalky concretions. The subependymal tissue was rarefied, and concretions were also present in it.

Group 3: The choroid plexus in schizophrenic patients—Cases 14-21.

All the patients in this group showed almost the same clinical symptoms, only two of them not certainly showing hallucinations of hearing. Most of them were in middle life, only one being an aged person. In one case the disease had lasted three years, in four cases from ten to seventeen years, in one six years and in one twenty-one years. As complications influenza was present four times, tuberculosis, carcinoma and embolus of the lungs, each once. Although the ages varied from 25 to 60 years and the course and complications of the cases were different, the pathology of the choroid plexus was extremely alike in all of the cases: they all showed large masses of the folia rolled together, severe atrophy going on to sclerosis; sometimes the folia were attached to the ventricle walls or penetrated the adjoining brain substance (mostly in coincidence with amyloid bodies), frequently whole rows of folia were desquamated so that the mesodermal tissue lay bare and cysts were formed under the folia from shrinking of the connective tissues. A large number of glandular cells were irregular in size and form, many plainly atrophic, others sclerosed, great numbers vacuolated or swollen. The swollen cells not infrequently showed ameboid protuberances which projected into the ventricles. The nuclei of the secreting cells were frequently lessened in size, not perfectly round, now and then showed no histologic structure or had entirely disappeared; sometimes mitoses of the nuclei were seen. In many cases the arterioles of the folia were much thickened or sclerosed. The veins sometimes contained thrombi of blood plates and pigment clumps. In the pericapillary spaces of the folia atrophy, larger or smaller cysts and sometimes marked proliferation of the connective tissue, were seen. Chalky and other concretions were common. Hyaline degeneration of the tips of the folia was often present. In all cases cellular exudation was seen between the folia, mixed with larger and smaller amyloid or albuminoid bodies and old and recent extravasations of blood. Desquamated cells were also found between the folia, etc.

The ependyma frequently was lacking for considerable distances on the ventricle walls, and in such localities large numbers of rather large bodies staining pale in hematoxylin were seen in the subependymal tissue. Small cysts were also found in the subependymal tissues.

Some of these alterations were seen in Group 2 (hyaline degeneration of the tips of the folia, connective tissue proliferation) and even in the oldest number of Group 1, but in the schizophrenic patients they were more marked, more diffuse and more varied than in the patients of the other groups. Above all, rolling up of whole folia, their atrophy in mass or scleroses, were never absent.

From a consideration of the twenty-one cases, the author concludes that pathologic alterations of the choroid plexus can be differentiated into three groups:

1. Cases in which pathologic processes preeminently go out from, or are expressed in, the mesodermal elements of the plexus and in which change of form in the secreting cells (atrophy, increase or decrease of size) is more secondary in character.

2. Diseases of the choroid plexus in which the secreting cells are the point of attack of the pathologic process and in which the connective tissue elements of the folia are drawn into the diseased state sympathetically.

3. A combined form in which the pathologic process attacks both elements together or one following the other.

An example of the first or mesodermal type is seen in Group 2, Case 8, and also with some exceptions in Cases 11 and 12. The second form, parenchymatous, ectodermal, is exemplified in Cases 18 and 21 of Group 3, and the third form (the combined ectodermal and mesodermal) is seen in Cases 15 and 16, characterized by fibrinous and cellular exudates in the spaces between the folia, extensive atrophy of the secretory cells, thrombosis of the capillaries, etc.

After a somewhat lengthy consideration of the relationship of the pathologic findings to psychotic states, a consideration of the clinical character of amyloid bodies, etc., and a summary of the experimental and anatomic work on the plexus done by Monakow and his school and many others, the author draws the following conclusions:

1. Pathologic alterations in the choroid plexus, as commonly found in diseases of the brain and in psychoses, can be placed in three groups (1, 2 and 3, as shown in the foregoing).

2. Atrophic changes in the ependyma and subependymal tissue are specially marked in connection with Group 2 (acute and chronic changes originating in the glandular cells).

3. Where the changes described in pathologic Group 2 and the changes described above in the preceding paragraph are diffuse and coincident, particularly in the plexus of the inferior horn of the lateral ventricles and in the fourth ventricle, severe psychic symptoms are observed in life, particularly of a schizophrenic character (acute and chronic delirium, delusions and hallucinations).

4. The pathologic processes limited to the changes described in pathologic Group 1 may remain latent for a length of time, but if the processes go beyond a certain limit, it is probable that stupor, "dämmer" states, disorientation (sometimes with delirium) in time and space will result.

GURD, Ann Arbor, Mich.

ZUR LEHRE DER ERKRANKUNGEN DES STRIARENS SYSTEMS (CONTRIBUTION TO THE STUDY OF DISEASES OF THE STRIATE SYSTEM). CECILE and OSKAR VOGT, J. f. Psychol. u Neurol. **25**:631, 1920.

Cecile Vogt in collaboration with Oskar Vogt, Bielschowsky, Brodmann and several other colleagues has for many years been devoting special attention to the anatomy, physiology and pathology of the striate system, and as far back as 1911 had formulated a striate syndrome. Several notable articles have been published by her since then, in particular one in this journal in 1918, volume 24, in collaboration with Oskar Vogt, in which the whole subject is

treated fully, and an attempt made not only to fix the striate syndrome, but also to relate the symptoms to various localities in the system and to explain their method of appearance.

The present article is a resumption and amplification of all the study done on the subject and forms a book of more than 200 octavo pages with nine illustrations in the text and seventy-eight full sized double tables at the end of the book.

The authors first give their reasons for their prolonged and intensive study of the striate system, namely, the relative ignorance both clinical and pathologic (at the time of the commencement of their studies) of the nervous system and its phenomena, and especially of the basal ganglions.

The striate system is then described in careful detail, first macroscopically and then microscopically. In the microscopic description much stress is laid on the fact that the caudate nucleus and the putamen are identical in structure, showing slight variations in the large and small nerve cells common to both, whereas the globus pallidus contains only one type of nerve cell, which is totally different from the cells of the other portions of the striate system.

Thirty-three cases of disease of the striate system are then described clinically and histopathologically, and a close analysis of the symptomatology and pathology is made with an attempt to explain the mechanism of the various phenomena.

Huntington's chorea receives special attention, five typical cases being analyzed. In general the pathology of the striate system is described as related especially to certain symptoms and not to diseases as a unit.

1. The striate system (in the narrow sense—caudate nucleus, putamen and globus pallidus) contains gray matter of physiologically higher and lower function. According to the destruction of gray matter of higher or lower physiologic moment, finer or coarser symptoms will appear. The loss of the finer functions of the striatum leads to continuous involuntary movements, while that of the coarser function of the globus pallidus causes rigidity with poverty of movements. In this way apparently unlike pictures of disease arise.

2. Their close connection is evidenced in that in the course of an individual disease the loss of the pallidus function is added to the loss of the striatum function, and may thus control the disease picture.

3. The intimate relationship of the picture of the disease (in the narrow sense) is made clear by the important fact that a one-sided affection of this neuron in any part results in a loss of striatum function on one side only.

4. The striate system represents a neuronic system, disease of which in any part (in accordance with the principles laid down in 1) calls forth a related syndrome, while processes of disease in other parts do not bring about this syndrome. The striate system, therefore, affords us an example showing that for the understanding of clinical and physiologic phenomena the nervous system must be considered in, or divided into, neuronic systems.

The striatum syndrome is made up of loss of function or of irritative symptoms. Loss of function is characterized by the following symptoms:

1. Striate akinesis, which is a component of poverty of mimic expression as well as of associated movements; changes of position; movements of orientation, protection or defense reflexes. This condition probably also expresses itself in a certain asthenia of the affected muscles.

2. Incoordination, which comes to view particularly in the bulbar musculature and in walking and standing.

3. Substriate (pallidus) hyperkinesis.

(*a*) Involuntary movements (choreatic movements, athetosis appearing only as a pseudo-Babinski sign, tremor; in great part exaggerated associated movements of expression, compulsory laughing and weeping) which (1) can always be voluntarily controlled for the moment, and (2) are called forth or exaggerated by peripheral stimulation and above all by psychic impressions (seelische Vorgänge) of an agreeable nature.

(*b*) Hypertonic conditions:

1. The duration and intensity of these are not yet sufficiently explained because we have not at our disposition pure striatum disease.

2. These conditions are strengthened by peripheral stimuli and above all by psychic stimuli, shown on finer analysis to be dependent on the emotions, but which are not exaggerated by continued stimulation and are lessened by nonirritative passive or active movements.

3. These conditions either attack by preference certain muscle groups or affect agonists and antagonists equally.

4. They cause a certain diminution of muscle strength or a slowness of movement.

5. Perhaps an occasional pathophysiological hypotonia as yet unclear.

6. The absence of other disturbances. Such a syndrome of disease will not be called forth by disease of any other portion of the cerebral gray matter so long as the striopetal and the striofugal paths are not involved. Disease of the striatum causes loss of function (Ausfalls erscheinungen) whose peculiarities are in proportional relation to its own individual architectonic.

The author's conception of a parallelism between architectonic and physiological differences is thus confirmed.

The following conclusions are drawn from the consideration of the striate syndrome as to the normal function of the striate system.

1. The striatum and pallidum of man show neither evolution nor devolution when compared with the same organs in the Cercopithecine brains. Therefore, the same function must be ascribed to these gray masses as that occurring in the lower apes.

2. The myelinization of the pallidus is so much earlier than that of the striatum and of the cortex that in all probability a time existed in ontogenetic development when pallidum reflexes uninfluenced by the cortex and the striatum represented the highest motor activity.

3. In the corticospinal tracts and in the cerebrum-pons-cerebellar tract a corticofugal path is furnished which, avoiding the pallidus and striatum, acts directly on the peripheral motor neuron.

4. The pallidal and striopetal path originates for the greater part at least in the thalamus and its contingent gray masses.

5. The subpallidary tracts do not act directly on the peripheral motor neuron.

In consideration of these anatomic facts the conclusion must be drawn from the pallidus syndrome (a general rigidity in limited tracts not seen in other pathologic conditions) that the pallidus gray matter exerts an inhibitory action normally on subpallidal gray centers.

From the striatum syndrome is to be predicated that the pallidus is the center for numberless primitive kineses.

The authors close their work with the expression that further intensive histopathologic and clinical study of the striate system will amply reward the worker both by increased knowledge of the diseases of the system and also of a number of general anatomic and physiologic questions.

GURD, Ann Arbor, Mich.

PATIENTS WITH MENTAL DISEASE, MENTAL DEFECT, EPILEPSY, ALCOHOLISM AND DRUG ADDICTION IN INSTITUTIONS IN THE UNITED STATES, JAN. 1, 1920. HORATIO M. POLLOCK, Statistician, State Hospital Commission, and EDITH M. FURBUSH, Statistician, The National Committee for Mental Hygiene, Ment. Hygiene **5**:139 (Jan.) 1921.

Data for this comprehensive study were obtained from practically all state, city, county and private institutions caring for the classes enumerated, and from thirty public health service hospitals. The institutions are classified thus:

1. Number of institutions	625
a. Public	388
b. Private	237
2. Public institutions for mental diseases:	
a. State hospitals	156
b. Federal hospitals	2
c. County and city institutions (not including those for temporary care)	125
d. Institutions for temporary care	21
3. State institutions for mental defectives	32
4. State institutions for mental defectives and epileptics	11
5. State institutions for epileptics	10
6. City institutions for mental defectives	1
7. Private institutions:	
(*a*) Having mentally diseased patients only	60
(*b*) Having mental defectives only	27
(*c*) Having epileptics only	6
(*d*) Having mental defectives and epileptics only	19
(*e*) Having inebriates (alcoholics and drug addicts only)	12
(*f*) Having more than one of these classes (excluding "d" above)	113
8. Public Health Service hospitals	30

Patients with Mental Disease.—On Jan. 1, 1920, there were 232,680 patients with mental disease actually in institutions in the United States. Of these, 200,109 were in state hospitals, 21,584 in county or city institutions, 1,040 in institutions for temporary care, 709 in Public Health Service hospitals and 9,238 in private hospitals. In 1918, the total number of patients with mental disease reported on the books of the several institutions was 239,820. Of this number 15,863 were reported as on parole from the state hospitals on the day of enumeration. The number on parole from private institutions was not obtained, but it is believed to be small. The number of patients actually in the institutions on Jan. 1, 1918, was approximately 223,957, or 8,723 less than the number on Jan. 1, 1920.

Of the 232,680 patients with mental disease in institutions on Jan. 1, 1920, 121,031 were males and 111,649 females. The percentages were 52 and 48, respectively. The number of males to each 100 females was 108.4. In 1918, the number was 110.6; in 1910, 110.8; in 1904, 109.6; in 1890, 107.4, and in 1880, 101.6.

With the marked decline in alcoholic psychoses and the gradual reduction of the syphilitic psychoses, it is probable that the excess of males in the hospitals for mental diseases and among admissions to them will ultimately disappear.

Mental Defectives.—The total number of mental defectives in institutions in the United States on Jan. 1, 1920, was 40,519. Of these, 34,836 were in state institutions, 2,732 in other public institutions and 2,951 in private institutions.

Mental defectives were reported in state institutions in all states except Delaware, Georgia and New Mexico, although on Jan. 1, 1920, there were fourteen states that had no separate institutions caring for such patients. The mental defectives reported in state institutions in Alabama, Arizona, Arkansas, Florida, Louisiana, Mississippi, Nevada, South Carolina, Tennessee, Utah and West Virginia were cared for in hospitals for mental disease. Of the 34,836 mental defectives in state institutions, 28,833, or 82.8 per cent., were in state institutions especially established for their care.

Compared with the census of mental defectives of Jan. 1, 1918, there has been an increase of 2,047 in state institutions, a decrease of 756 in other public institutions and a decrease of 153 in private institutions. The increase in total patients amounts to 1,138. As only a small portion of the total number of mental defectives is cared for in institutions, the census throws no light on the prevalence of mental defect in the general population.

Epileptics.—Exclusive of the epileptics included among the patients with mental disease, there were on Jan. 1, 1920, 14,937 epileptics under treatment in institutions of the United States. Of these, 13,223 were cared for in state institutions, 859 in other public institutions and 855 in private institutions. Compared with the census of Jan. 1, 1918, there was an increase of 2,781 epileptics in state institutions, a decrease of 92 in other public institutions and an increase of 304 in private institutions. The total increase in all institutions was 2,993. The prevalence of epilepsy in the general population is not indicated by these figures as only a small proportion of the total number of epileptics is in institutions.

Colorado, Delaware, Georgia, Nebraska, New Mexico and Washington report no epileptics in state institutions other than those included among the patients with mental disease. In only twelve states are epileptics cared for in city or county institutions. Nearly one half of the epileptics in private institutions are reported from Pennsylvania.

Alcoholics.—The alcoholics in institutions in the several states on Jan. 1, 1920, other than those included among the patients with mental disease, numbered 1,163. Of these, 587 were cared for in state institutions, 331 in other public institutions and 245 in private institutions.

In the census of 1918 the alcoholic patients and drug addicts were included in one group under the term "inebriates." In the present census the two classes were separated. In view of the oft-expressed opinion that restriction of the sale of alcoholic beverages would greatly increase the use of drugs, it is noteworthy that the total number of alcoholic and drug inebriates in institutions in the United States decreased from 3,565 on Jan. 1, 1918, to 1,971 on Jan. 1, 1920. On Jan. 1, 1917, the total inebriates in institutions in this country numbered 4,891, or two and one-half times the number shown by the 1920 census.

While there are many alcoholic patients and drug addicts outside of institutions, the marked reduction of the number in institutions indicates that the number outside is also decreasing. This conclusion is further supported by the fact that the number of alcoholic and drug patients among first admissions to the New York State hospitals for mental diseases has markedly declined in recent years.

Drug Addicts.—The drug addicts in institutions in the United States on Jan. 1, 1920, numbered 808. Of these, 314 were in state institutions, 78 in other public institutions and 416 in private institutions. These figures throw little

light on the prevalence of drug addiction as most drug addicts are not receiving institutional care. As no other separate census of drug addicts in institutions has been taken in recent years, no basis of comparison is available.

Of the 808 drug addicts in institutions, 544 were males and 264 females, or two males to each female. New York is the only state in which the number of drug addicts reported reached 100.

Increase of Patients with Mental Disease.—The institutional care of the insane has increased enormously since 1880, when the first separate federal census of the insane in institutions was taken. The absolute numbers of patients under treatment, as well as the rates of patients to population, have increased at each succeeding census.

PATIENTS WITH MENTAL DISEASE IN INSTITUTIONS, 1880-1920

Year	Number	Per 100,000 of General Population
1880	40,942	81.6
1890	74,028	118.2
1904	150,151	183.6
1910	187,791	204.2
1918	223,957 *	217.5
1920	232,680 *	220.1

* Excluding paroles.

BAILEY; New York.

A CONTRIBUTION TO THE HISTOPATHOLOGY OF CARBON MONOXID POISONING. R. M. STEWART, J. Neurol. & Psychopath. 1:2 (August) 1920.

Two views are expressed concerning the effects of carbon monoxid on the system: one holds that the gas produces an anoxemia by combining with the hemoglobin and preventing proper oxygenation of the blood, while the other holds that the gas has a specific action on the tissues of the nervous system. The author points out that the dyspnea so characteristic of asphyxiation is lacking in gas poisoning and infers that the respiratory center, with other centers, is interfered with to such an extent that it cannot respond to the increased demand for oxygen.

The characteristic symptoms of carbon monoxid poisoning are: headache, vomiting, impairment of higher mental functions, impairment of the special senses and voluntary motor power—and in severe cases loss of consciousness and death. In the discussion of the pathology, Mott is quoted as having found capillary hemorrhages and various chromatolytic changes in the brain cells with widespread fatty degeneration of the endothelium of the blood vessels. Davies is reported as unable to find punctate hemorrhages in his case. In those who survive, it is found that the symptoms predominating are referable to the nervous system, leading to the conclusion that here is found the main pathology.

The author reports a case coming under his observation and in which death occurred on the twenty-fourth day, and gives the gross and histologic findings. He states that death occurring early fails to give the pathology that is found in those cases that continue for some time. Clinically, his patient presented a picture of extreme debility, constipation, cyanosis, normal temperature, albuminuria, unequal pupils, exaggerated knee reflexes, wasting of the small muscles of the left hand, moderate stupor, apathy, and difficulty in being persuaded to take food. Four days later (seventh day of illness), his temperature rose to 100 F., his torpor gave way to a condition of restlessness, and he frequently

cried out. Five days later a spinal fluid examination revealed a lymphocytosis and positive Noguchi reaction. Two days later he seemed better and tried to speak, but showed incontinence and marked wasting of the muscles of the thenar and hypothenar muscles of the left hand. At the end of the next four days wasting was present in the muscles of the other hand, and on the following day he died.

At necropsy the gross findings were: hyperemia of the pia with thickening evenly distributed; a grayish white line near the surface in the gray matter running practically throughout the entire cortex suggesting cerebral softening. There were no punctate hemorrhages. The globus pallidus had a small area of softening bilaterally in exactly similar situations and similar in size.

Histologically, there was a zone of softening in the deeper layers of the cortex, which was present in all sections. Above and below this line of softening the cells were markedly altered but still recognizable, whereas in the line they had completely disappeared or nearly so. In the pia arachnoid there was evident congestion of the blood vessels, with numerous hyaline thrombi. The cellular proliferation in the pia consisted of plasma cells, fibroblasts, polyblasts and red cells. In the line of softening there was a large amount of disintegrating lipoid substance, which stained deeply with acid dyes. All traces of axis cylinder were lost in this area, but observed well, above and below. The neuroglia tissue showed active proliferation. There was increased vascularity with formation of new vessels and the presence of many hyaline thrombi. Parenchymatous and interstitial changes were found in the cortex not immediately involved in the softening process. The white matter showed widespread degeneration of the myelin sheaths, with various morbid changes in the axis cylinders, increase in neuroglia, and hyaline thrombi in vessels, but no free hemorrhages. In the basal structures the globus pallidus showed changes confirmatory of the gross picture, with a large number of Kornchenzellen filling it. The optic thalamus showed hyalin thrombosis. The cranial nerves showed myelin degeneration more particularly marked in the vagus than in any other locality. The cerebellum showed colloid substance beneath the pia, hyaline thrombosis, chromatolytic changes in the Purkinje cells, and myelin degeneration. The pons, medulla and cord showed the same myelin and axis cylinder changes, with practically no normal cells in any region. Ganglion cells were similarly affected. Reich corpuscles were found in the cord lying free in the tissue spaces, apparently having no relation to blood vessels, and arranged in rows (on longitudinal section) as though they followed a degenerated axis cylinder.

The author, in his remarks, interprets the widespread parenchymatous degeneration on the basis of an hematogenous intoxication, with the vascular arrangement in the cortex accounting for the peculiar distribution of the degeneration. Experimental observations have disclosed the fact that the infragranular layers of the cortex are the anastomotic points of the long and short branches of the pial vessels, and hence there is found here the richest blood supply. The necrosis in this area cannot be explained by mere deprivation of oxygen (despite the greater vascularity) for experimental work has shown that the effect of deprivation is more generally distributed. The carbon monoxid therefore acting as an exogenous poison, and being present here in larger quantities because of the fine mesh of capillary formation, attacks with greater virulence, and produces the widespread but selected area of necrosis. Of course, other factors must be considered also, such as arrest of circulation favored by the anastomotic arrangement as mentioned, by the fine caliber of the capil-

laries and by the hyaline thrombi which were found everywhere in the cortex. Softening in the striate body is apparently characteristic of gas poisoning but the explanation for it is perhaps more difficult on the basis of vascular arrangement than in the cortex. The distribution of blood vessels evidently has little to do with it since areas supplied by the same vessel are not similarly affected. However, it was noted that the most marked degenerative change was around the blood vessels. This, however, is not sufficient to explain the completeness of the softening of the globus pallidus and its restriction to this area. There remains, then, the theory that the gas has a selective affinity for the tissues of the lenticular nucleus.

The presence of plasma cells, lymphocytes and red cells, the increased vascularity of the cortex and other changes are accounted for on the basis of some preexisting condition, possibly a syphilitic infection. The final conclusion drawn is that the carbon monoxid acts indirectly on the nervous tissue by diminishing the supply of oxygen and directly by specific action on the tissues themselves.

PATTEN, Philadelphia.

ZUR FRAGE DES "PARKINSONISMUS" ALS FOLGEZUSTAND DER ENCEPHALITIS LETHARGICA (REGARDING PARKINSONISM AS A SEQUEL TO LETHARGIC ENCEPHALITIS). ROBERT BING, Schweiz. med. Wchnschr. **1**:4 (Jan. 6) 1921.

Since the first epidemic of lethargic encephalitis in Vienna, in 1916, numerous types of this protein disease have been encountered. The 1920 epidemic in Austria presented a preponderance of a tabetic type, characterized by absence of patellar reflexes and pupillary disturbances. True Argyll Robertson phenomena were noted, which, as the author states, had up to this time been considered as distinctly syphilitic in origin. In recent epidemics, cases have presented themselves showing a marked similarity to Parkinson's disease.

In the majority of cases of postencephalitic parkinsonism, a distinct resemblance to paralysis agitans may be noted. Some cases are symptomatically identical "so that without an anamnesis, the diagnosis would, without doubt, be Parkinson's disease.

The writer presents two cases, the first having a history of three years' duration, being typically parkinsonian in type, and showing no indications of improvement. The second case, with a history of one year, was not so characteristic of paralysis agitans and recovery was fair. The first case was that of a man, aged 47, whose trouble began in December, 1917, with lethargy, a slight temperature, bilateral ptosis, anisocoria, nystagmus and tremors. By February, 1918, the patient was up and about but during that summer a gradual and general muscular rigidity appeared, since which time he has developed a mask-like facies, a typical posture and a "démarche a petits pas," a pill-rolling tremor, etc. This case Bing feels is a typical paralysis agitans with the usual prognosis.

The second case, a man of 46, in February, 1920, had a slight temperature with loss of pupillary reflexes, diplopia and tremor. Later there were muscular weakness with increasing slowness of motion, slight paresis of the left arm and left side of the face, and some difficulty in swallowing. Gradually the patient improved and resumed his work though at the end of a year there still remained some muscular weakness with salivation. Bing considers this an

atypical case, not distinctly parkinsonian, and a better prognosis might be offered.

The author does not believe that the tremor lends itself to prognostic value, and he cannot agree with the work of Sicard and Paraf in which they recognize three types, depending on the degree of tremor on which they base their prognosis. Even though the author's own cases fit in their classification, a prognosis based on tremor is rash, for not infrequently the cases "sine agitatione" become rapidly and progressively worse. This also has been noted by Babinski, who observed that the pill-rolling type may recover. Bing believes, and is in accord with Netter, that the postencephalitic Parkinson's disease and the usual paralysis agitans are the same. It is the author's belief that just as sporadic cases of poliomyelitis may occur, so sporadic cases of paralysis agitans may occur. He further believes that Parkinson's syndrome may occur on the basis of various other conditions, such as status lacunaris cerebri, Bechterew's hemitonia postapoplectica, striate syndrome of Cecil Vogt, etc., the outstanding feature in these cases being the localization of the lesions, and the site being in the corpus striatum, the hypothalamus and midbrain regions. Bing believes that all the histopathologic work, as done by Jelgersma in relation to the striothalamic fibers and ansa lenticularis, that of Ramsay Hunt with the globus pallidus, Trétiakoff with the substantia nigra, point in one direction, namely, that they indicate a lesion of the striate body and its neighboring parts.

The tremor of paralysis agitans, according to the work of Economo and Karplus, may be attributed to the nucleus ruber, as was demonstrated by their experimental work and also by the work of Wilson and Holmes. The extrapyramidal rigidity (so-called because of absence of the Babinski and similar reflexes) is considered by Wilson to be due to an abolition of the functioning inhibition existing in the striate via thalamus and pyramidal cells. According to Lhermitte, the globus pallidus has special relation to tonus. Bing states that the secretory disturbances, such as salivation and hyperhidrosis, are due to 'tween brain disturbances, for he states that we cannot doubt the importance of considering vegetative tracts passing through this region. These secretory disturbances are frequently found in postencephalitic parkinsonian cases. Netter attempted to show that this salivation was due to infection of the salivary glands and not to a central manifestation. This, however, is not in accord with Bing's view.

The writer does not feel that the postencephalitic parkinsonian cases are due to the presence of the virus, but that the initial lesion is so intense as to cause a disease picture which is distinctly progressive and incurable.

Trétiakoff and Bremer at necropsy examination in a postencephalitic Parkinson's case found some inflammatory residuals, also bilateral degenerative atrophy of the substantia nigra. This concurred with Bing's view that a definite pathology is established and that the remaining syndrome is not due to the presence of the virus.

The writer feels that the present epidemic encephalitis has presented such a complicated and vast array of lesions in the 'tween brain and midbrain that a systematic histopathologic study of this rich material should certainly, in conjunction with clinical findings, solve many of the puzzles of brain localization.

MOERSCH, Rochester.

DECLINE OF ALCOHOL AND DRUGS AS CAUSES OF MENTAL DISEASE. Horatio M. Pollock, Statistician, State Hospital Commission, Ment. Hygiene 5:123 (Jan.) 1921.

The data which form the basis of this article were compiled from the statistical cards of first admissions received by the New York State Hospital Commission from the thirteen civil state hospitals under its jurisdiction during the twelve fiscal years beginning Oct. 1, 1909, and ending June 30, 1920.

The total first admissions of alcoholic patients during the twelve fiscal years were 5,317 of which 4,007 were males and 1,310 were females. During the five fiscal years 1909 to 1913, inclusive, the annual number of alcoholic cases averaged 574 and varied but little. In 1914, there was a marked drop in the number, and this was followed by another drop in 1915. In 1917, a marked increase occurred but this was followed by a rapid decline until, in 1920, the total alcoholic first admissions numbered only 122. The percentage of alcoholic cases among first admissions dropped from 10.8 in 1909 to 1.9 in 1920.

Rate of Alcoholic First Admissions to the Civil State Hospitals for the Insane Per 100,000 of the General Population of the State, 1909-1920

Year	Number	Rate Per 100,000 General Population
1909	561	6.3
1910	583	6.4
1911	591	6.4
1912	565	6.0
1913	572	6.0
1914	464	4.8
1915	345	3.6
1916	297	4.0*
1917	594	6 0
1918	354	3.5
1919	269	2.6
1920	122	1.2

* Reduced to yearly basis.

It will be noted that the rate of alcoholic first admissions per 100,000 of the general population declined from 6.4 in 1910 to 1.2 in 1920.

Intemperate Use of Alcohol.—If the facts concerning the decrease in alcoholic insanity stood alone they might be interpreted as being due to changes in diagnosis rather than to changes in the use or influence of alcohol. Additional light is thrown on the matter by the record of the intemperate use of alcohol by first admissions prior to the onset of the mental disease.

It appears that of the first admissions of 1909, 44.2 per cent. of the males and 15.1 per cent. of the females were intemperate users of alcohol. In 1920, only 20.3 per cent. of the males and 3.7 per cent. of the females were reported in the intemperate group.

In considering these facts in connection with the prohibition amendment, it should be remembered that the amendment was in force for only five and one-half months of the fiscal year that ended on June 30, 1920. Of the 122 new cases of alcoholic insanity admitted to the civil state hospitals during the year, seventy-five reached the hospitals before Jan. 16, 1920, and forty-seven after that date. As nearly all forms of alcoholic insanity result from long continued and excessive use of alcohol, it would be expected that some cases

would develop after the public sale of intoxicating liquors ceased. The great reduction in the rate of admissions of new alcoholic cases since the amendment went into effect indicates that excessive drinking has been much lessened, although not entirely stopped.

In this connection it should be remembered that for several years prior to the passage of the prohibition amendment there had been a gradual decline in excessive drinking and that during the greater part of the war traffic in distilled liquors was forbidden.

Mental Disease Due to Drugs.—It was feared by many that the discontinuance of the public sale of alcohol as a beverage would result in increased indulgence in the use of narcotic drugs. It was found, however, that the drug cases among first admissions have declined rather than increased during the past year.

Drugs have never been prominent among the causes of insanity in New York State. The highest number of drug first admissions to the civil state hospitals recorded in any one of the past twelve years was thirty-six in 1914. These constituted about 0.6 per cent. of the total first admissions. Since 1914, the annual number of drug cases has declined, there being but eleven, or less than 0.2 per cent. of all first admissions in 1920.

BAILEY, New York.

DREI FAELLE VON FAMILIAERER ZEREBRALER KINDERLAEHMUNG (THREE CASES OF HEREDITARY INFANTILE CEREBRAL PALSY). KRETSCHMER, Deutsch. med. Wchnschr. **46**:1241 (Nov. 4) 1920.

The author presents the history of three brothers in whom, during the twelfth year of life, a slowly progressive disease made its appearance. The disease was characterized by a spastic paraplegia, or tetraplegia, appearance of club foot, partial optic atrophy, impediment of speech and a more or less marked mental retardation. All three brothers were physically well until the onset of the trouble. The two younger brothers did poorly in school from the start, while the older showed but little mental change even after the onset of his affliction. The rate of progress up to the time of the author's examination was practically the same in all three cases.

The family history was negative throughout. A younger sister, aged 15, was well, both mentally and physically. The author gives the complete findings in the three cases.

CASE 1.—F. M., aged 20, up to the age of 12 progressed rapidly, at no time presenting any abnormality. At 12 years of age, stiffness appeared in the lower limbs, and his progress in school became retarded due to slowness in his speech. An examination made in November, 1919, showed that he was well built and in good health. He showed a general spasticity, most marked in the lower limbs, with inability to walk unless aided. He walked with a scissors gait. Motor power was impaired only by rigidity. No ataxia was noted in the various tests. Bilateral pes equino-valgus was present. The deep reflexes were exaggerated and the Babinski sign was present. Speech was slow and stammering. Memory was poor for recent events, with impairment in general knowledge. The fundi showed a temporal pallor of the optic nerve heads. Examination was otherwise negative. There was no nystagmus, sensation was intact, etc.

The two brothers, aged 16 and 15 years, respectively, presented practically the same findings. Both were well up to the age of 12. They were never very

bright and had marked difficulty in learning. At the age of 12 rigidity appeared in the lower limbs. This general condition gradually progressed until the patients presented practically the same picture as the older brother. At no time was ataxia noted. The one (aged 16) presented lost patellar and Achilles' reflexes. The other (aged 15) had diminished abdominal reflexes.

In the differential diagnosis, Kretschmer first takes up Friedreich's ataxia, which he states may at times closely resemble hereditary cerebral palsy. The absence of ataxia in all three cases is, however, sufficient to exclude this condition.

The familial occurrence of multiple sclerosis (Oppenheim) is next considered. In the author's cases the absence of nystagmus, intention tremor and the presence of mental enfeeblement from onset, speak against such a diagnosis.

The author believes that his cases conform most closely to Strümpell's hereditary and familial form of spastic spinal paralysis, which by many is considered a form of hereditary cerebral palsy. To tell to which form of infantile cerebral palsy these cases belong is difficult. The author believes that the so-called Little's disease may be ruled out because of the late development, even though Little's disease may be familial. Gower's abiotrophy, which has been substantiated by Schaffer, Vogt, and others, in cases of this type in which marked ganglion cell changes were found, seems to the author to explain the condition presented. The majority of these ganglion cell changes were found in cases of familial amaurotic idiocy. In the Vogt-Spielmeyer type of this disease, the onset occurs late; in patients from 4 to 16 years of age, the progress is slower and the disease has the same symptoms, but in place of a macular change, it shows a simple optic atrophy. The Vogt-Spielmeyer type is not racial, but alcoholism in the parents seems to play a part. Kretschmer believes that his cases would perhaps fit best into some such group, even though his patients did not show an impairment of vision.

Even though the immediate family history is negative for nervous afflictions, the fact that the three males were affected and not the female, is indicative of an abiotrophy. Other hereditary anomalies show this tendency to sex differentiation, such as hemophilia, colorblindness, etc.

The question of a hereditary syphilis must be considered as it may play a part in Little's disease. The repeated negative Wassermann reactions, the late appearance of the symptoms, the absence of miscarriages and a healthy daughter who has already passed the period of onset by two years, argues against such a possibility.

The author in closing brings up the subject of inheritance, again calling attention to the possibility of transmission of the disease as in hemophilia, colorblindness, etc. He believes that necessarily similar conditions have occurred in the progenitors, or it would not be possible to explain the appearance of the disease in the three brothers at the same age. The prognosis in these cases is hopeless, and as a rule these patients spend the remaining years of their life in public institutions.

MOERSCH, Rochester, Minn.

ETUDE EXPERIMENTALE DES LESIONS COMMOTIONNELLES DE LA MOELLE EPINIERE (EXPERIMENTAL STUDIES OF CONCUSSION OF THE SPINAL CORD). G. ROUSSY; J. L'HERMITTE, and L. CORNIL, Ann. de méd. 8:355 (Nov.) 1920.

The authors report the effects of concussion from direct and from indirect spinal traumatism.

The first type of injury was inflicted on experimental animals (rabbits and guinea-pigs) by direct blows of a trepanning hammer on the spinal column.

The strength of the blow is well indicated by the statement that in several animals rupture of either a viscera or an important blood vessel occurred with rapid death. Among sixteen animals subjected to concussion in this fashion only seven were retained as suitable for further research.

These seven animals were then killed at varying dates after traumatism: one after three and one-half months, others after twenty-one, twelve and eight days, and three immediately following the trauma.

Indirect traumatism was used in one instance. The animal (dog) anesthetized was fixed solidly with his back along a plank. Then a dozen blows were struck on the plank so violently that the spine was severely jarred. The animal showed no effects until two months later. At that time, a cachexia began which progressed to death six months after the traumatism.

The following tissue alterations were found following the direct trauma (even present in the animals killed immediately after the trauma): an acute degeneration of the myelinic fibers, chiefly in the anterolateral tracts and posterior columns; small areas of necrosis involving the neuroglia and neurons; intense coloration of the nerve fibers of the radicular zones with the presence of vacuoles; and dilatation of the ependymal canal. The nerve fiber degeneration was shown by hypertrophy of the axis cylinders, which had become moniliform, owing to fragmentation. The writers especially emphasized the minimal character of the changes in the cells of the gray matter. In no case did they encounter hemorrhage as part of the lesion.

The concussion of the spine by indirect traumatism gave a different histologic picture as the damage was limited to the nerve cells of the anterior horns and only appeared microscopically: atrophy of the cell body, granulation of the cytoplasm, diminution of the Nissl bodies, and regressive alterations of the nucleus. The writers are inclined to consider that their findings support the thesis of Kirchgässer that the intensity of nerve cell alterations is in inverse ratio to the violence of the concussion.

In the summary the authors emphasize anew that concussion brought about by direct traumatism affects the myelinized fibers of the spinal tracts while that from indirect traumatism exercises a less intense action on the cells of the gray matter.

These findings are confirmatory of the work of some of the former investigators, particularly of the observations of Schmaus and of Jakob.

DAVIS, New York.

UEBER REZIDIVIERENDE SCHLAFFE LAEHMUNGEN NACH FRUEHERER EPIDEMISCHER POLIOMYELITIS (RECURRING FLACCID PARALYSIS FOLLOWING EPIDEMIC POLIOMYELITIS).

GEORGE BALLER, Neurol. Centralbl. **39**:658, 1920.

The patient, a girl aged 14, had poliomyelitis in 1909, which affected the right arm and leg. The leg recovered completely in fourteen days, the arm in six weeks with slight, but permanent, weakness and atrophy. In the spring of 1917, a few days after she had had diphtheria, she gradually developed a complete flaccid paralysis of both legs. This was associated with severe pains and reduction of sensibility. She recovered in six weeks. Three months later following a cold with fever, and pains in the legs, a flaccid paralysis in the lower extremities recurred with recovery in three weeks. In the fall of 1917 and again a year later, like recurrences of paralysis with fever and pains occurred, from which she recovered in three and five weeks. In February,

1919, she again had severe tonsillitis. Five weeks later pains developed in the right arm and within two days a complete flaccid paralysis occurred. This had been present six weeks when the author's observation began.

The child was pale, weak, not "nervous," without fever and with sound organs. The tonsils were enlarged without plugs or exudate. Tests were negative for malaria and diphtheria bacilli. The Wassermann test of the blood was also negative.

The neurologic examination was negative except in the right arm where were noted: complete flaccid paralysis except for slight flexion and extension of the first phalanges of the fingers and slight atrophy of the arm and forearm. The arm fell in proportion to its weight; the skin of the hand was slightly cyanotic; triceps, periosteal and direct muscular irritability were greater on the right than on the left; sensation was normal; and reaction of degeneration was absent.

Definite improvement was first noted seven weeks later in the flexion and extension of the fingers and weak flexion of the elbow. Gradually, improvement extended proximately with complete recovery in six months from the onset with a residual atrophy no greater than followed the illness of 1909. The illness of 1909 was observed in the Marburg Clinic and diagnosed as anterior poliomyelitis.

The author recognizes the difficulty of accurate diagnosis and considers hysteria, paroxysmal paralysis, malaria, myasthenia, multiple sclerosis, diphtheritic neuritis, idiopathic or rheumatic polyneuritis, believing that these can be excluded with reasonable certainty. The preservation of the tendon reflexes is unusual, but he suggests that some associated changes in the pyramidal tracts may explain this. The specific agent here at work resembles that of anterior poliomyelitis so closely that this tentative diagnosis is offered.

SHELDEN, Rochester, Minn.

DIE AFFEKTIONEN DES NERVENSYSTEMS DURCH AKUTE INFEKTIONSKRANKHEITEN SPEZIELL DIE GRIPPE (AFFECTIONS OF THE NERVOUS SYSTEM RESULTING FROM ACUTE INFECTIOUS DISEASES, ESPECIALLY FROM INFLUENZA).

HAROLD SIEBERT, Monatschr. f. Psychiat. u. Neurol. **48**:149 (Sept.) 1920.

The author groups his cases in four classes:

1. Pure psychotic disturbances.
2. Psychotic manifestations associated with meningitis or encephalitic processes.
3. General neuroses.
4. Peripheral nerve lesions.

1. Pure Psychotic Disturbances: These may occur either at the onset of the disease or after defervescence. In the author's experience all those occurring at the onset of the disease were accompanied by meningitis or encephalitic manifestations. Psychoses uncomplicated by evidence of cerebral disease occurred during or following defervescence. Some were typical amentias, others showed a katatonic syndrome, still others a manic picture. In all these the author stresses the exogenic factor; he believes the influenza toxins can produce any of these pictures, quite independent of endogenic factors. In general, the outlook is good for a complete resolution of the mental symptoms. Where an endogenic basis does exist, the outlook is not so good.

2. Psychotic manifestations associated with meningitic or encephalitic processes.

3. General Neurosis: There can be no doubt about the development of neurasthenic symptoms as a result of infectious processes, and we need not assume any endogenic basis. However, in many cases both factors play a rôle, and the extent of the endogenic basis probably has much weight in determining the ultimate outlook. In the pure exogenic neuresthenias there was a striking muscular weakness and muscle tenderness; on the affective side, fear was a frequent symptom; sleeplessness and headaches were common. On the vegetative side, there was a tendency to vasomotor disturbances, palpitation, increased secretion and excessive sweating.

4. Affection of Peripheral Nerves: This occurred in the form of neuritis and polyneuritis.

SELLING, Portland, Ore.

PARAPLEGIE EN FLEXION D'ORIGINE CEREBRALE PAR NECROSE SOUS-EPENDYMAIRE PROGRESSIVE (FLEXION PARAPLEGIA OF CEREBRAL ORIGIN AS A RESULT OF PROGRESSIVE SUBEPENDYMAL NECROSIS). P. MARIE and C. FOIX, Rev. Neurol. **27**:1 (Jan.) 1920.

Marie and Foix report a case of flexion paraplegia (in a woman, aged 70) in which there was determined at necropsy, extensive subependymal necrosis of both paracentral lobules, resulting apparently, from partial obliterations in the course of the anterior cerebral arteries.

There was a history of paraplegia of many years' duration, which at the time of examination, was definitely of the flexion type, although the authors are unable to state whether or not this had always been the case. Locomotion was impossible. The characteristic attitude was that of hyperflexion of the legs on the pelvis, associated with marked movement limitation of the knees and hips, although passive ankle movement was still possible. The lower extremities showed marked muscular weakness with atrophy, particularly of the quadriceps femoris. Examination of the upper extremities revealed nothing of note except a peculiar flattening of the left hand, associated with trophic changes in the fingers, due apparently, to the patient's habit of interposing this member between her body and the bed surface, in avoidance of the irritation arising from such contact.

The patellar reflexes were absent bilaterally. The Achilles reflex could not be obtained on the left and was much diminished on the right. There was no determinable disturbance in the tendon reflexes of the arms. The abdominal reflexes could not be elicited, and the plantar response was of the extension type bilaterally but was more marked on the left. There was apparently no ankle clonus, and no disturbance was observed in general sensibility. The reflexes of automatism were much exaggerated bilaterally, and partial incontinence was reported. The pupils were unequal, and reaction to light and accommodation was apparently much impaired, although a definite statement could not be made owing to cooperative difficulty. Mentally, there was marked enfeeblement in all fields. The occurrence of spasmodic laughter was noted and speech, although definitely explosive and monosyllabic in type, showed no frank evidence of dysarthria.

RAPHAEL, Kalamazoo, Mich.

TUBERCULOUS MENINGITIS. GEORGE FRANKLIN LIBBY, J. A. M. A. **75**:1691 (Dec.) 1920.

Early recognition of tuberculous meningitis necessitates a clear conception of the constitutional, as well as of the ocular, symptoms of the disease. A definite description is difficult to obtain from the literature extant. The theories of the mode of tuberculous infection of the meninges as given by various

writers are reviewed, as well as a number of typical cases in which there were the usual symptoms and course. The author reports four cases of tuberculous meningitis in adults, of the type that is usually first recognized by the ophthalmologist because of the ocular symptoms. The onset of the disease is characterized by severe and constant headache, dimness or loss of vision, paralysis of one or more ocular muscles and, in many patients, ophthalmoscopic changes and hyperemia of the retina and papilla. Miosis, mydriasis and optic neuritis are often present.

In the author's experience tuberculous meningitis preponderated in adults and was more common in men than in women. Early in the disease the symptoms were similar to those of eye strain; there was constant persistent headache with dimness of vision, followed by ocular palsies. Ophthalmoscopic examination was usually negative at first but later became positive. Choked disks with marked retinitis and occasional retinal hemorrhages were rarely observed. Tubercles of the choroid were never seen, but a history of pulmonary tuberculosis was present in all cases observed by the author.

A headache of sudden onset and persistent in character in an adult patient with a history of pulmonary tuberculosis either active or quiescent, should awaken suspicion of tuberculous meningitis, especially if associated with ocular palsy or impairment of vision.

OTT, Rochester, Minn.

LES ALTERNATIVES D'EXCITATION ET DE DEPRESSION, DYSTHMIE CONSTITUTIONELLE ET PSYCHOSE PERIODIQUE (ALTERNATIVE EXCITATION AND DEPRESSION, CONSTITUTIONAL DYSTHYMIA AND PERIODIC PSYCHOSIS). R. BENSON, Rev. Neurol. **27**:30 (Jan.) 1920.

Benon concludes from his study that the characterization "alternative excitation and depression" is loose and clinically inexact. Thus, one must, he points out, in the consideration of "excitation" states, differentiate between five primary types: true manic excitement or "hypersthenia," excitation dependent on "joy" or elation, "anxiety" excitement, "choleric" or rage excitement, and confusional excitement. In contrast to the manic or hypersthenic condition, the depressed state is to be regarded as essentially asthenic in basis, although it may occasionally be found to be dependent on hypothymia or apathy. Benon finds this psycho-physiologic point of view essential to proper comprehension of the depression concept, and in that sense, superior to the older affective or mood conception by which it was made synonymous with "melancholia" in its Kraepelinian significance.

Alternative excitement and depression, while determinable in almost all psychopathologic states, is primarily characteristic of constitutional dysthymia and periodic dysthenia (periodic psychosis of Ballet; manic-depressive insanity of Kraepelin), becoming manifest in the former as a function of the operation of extrinsic stimuli, and in the latter, apparently without objective cause, as a result of intrinsic psychic constitution or make-up.

The author feels the application of the term cyclothymia as synonymous with periodic dysthenia, a misuse, indicating that it should be employed solely to designate the "periodic dysthymias" (periodic anxiety, periodic rage, etc.).

RAPHAEL, Kalamazoo, Mich.

Society Transactions

BOSTON SOCIETY OF PSYCHIATRY AND NEUROLOGY

*Meeting at the Peter Bent Brigham Hospital, Jan. 20, 1921**

GEORGE A. WATERMAN, M.D., *President*

TWO CASES OF TUMOR OF LEFT SUPRAMARGINAL GYRUS WITH APRAXIA. DR. FRITZ BREMER.

CASE 1.—Reported in full in this issue, p. 663.

CASE 2.—The second patient was admitted only a week ago with complete global aphasia, right hemiplegia, apraxia, and mental symptoms, in addition to marked general pressure syndrome of tumor. He was operated on three days ago, at which time an enucleable tumor, as in the former case, was removed from the left supramarginal gyrus. It proved to be a glioma about the size of a tennis ball. There was very rapid postoperative recovery from practically all the preexisting symptoms. The day after operation the patient's mentality was normal, his paralysis had largely disappeared, speech was almost completely regained, and there was but a slight trace of apraxia.

Photographs, diagrams and roentgenograms of the cases were shown.

EXPERIMENTAL DIABETES INSIPIDUS. Presented by DR. PERCIVAL BAILEY and DR. F. BREMER.

This preliminary report concerned the experimental production of prolonged states of high-grade polyuria by minute lesions of the hypothalamus (post-infundibular region). These lesions were made not by the cruder methods heretofore employed, but by bringing the region directly under observation by means of lateral craniotomy. The observations were made on dogs.

DISCUSSION

The discussion was devoted largely to the differentiation between polyurias supposedly of pituitary origin and those due to a lesion of the third ventricle. It was conceded that Dr. Bailey's experiments for the first time conclusively showed that in the production of diabetes insipidus a center at the floor of the third ventricle rather than a disturbance of the hypophysis was at fault. Dr. Bailey was unable to say whether this form of experimental diabetes insipidus could be controlled by injection of pituitary extract.

A CHOLESTEATOMA OF UNUSUAL SIZE REMOVED AT OPERATION. Presented by DR. CUSHING.

The patient was an army officer, who had served in France and who was supposed to have a psychoneurosis. He had not even been a tumor suspect.

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* Held on the invitation of Dr. Cushing.

He was an alert and capable officer, the only complaint of his superiors being that he was inclined to assume responsibilities to which he was not entitled. Consequently he had been brought before army examining boards. Various diagnoses had been made; e. g., dementia praecox; general paresis.

A roentgenogram of the skull showed a sharply delimited area of bone absorption in the parietal region, measuring 9 by 8 cm. In one or two places the bone was completely absorbed, and a needle introduced through one of these points of absorption revealed no fluid, though the roentgen-ray appearances suggested a large cyst.

At operation an enormous extradural cholesteatoma, the size of a fist, weighing 175 gm. was removed. The astonishing features of the case were the presence of such a huge tumor, probably of many years' duration, deforming the left hemisphere to an unusual degree without producing any notable symptoms.

Stereoscopic roentgenograms, the tumor, photographs and diagrams were shown. (The case is to be reported in full.)

RESORPTION OF THE CEREBROSPINAL FLUID BY THE CHOROID PLEXUSES UNDER THE INFLUENCE OF INTRAVENOUS INJECTION OF HYPERTONIC SALT SOLUTIONS.

Presented by Dr. Frederick Foley (by invitation).

Dr. Foley reported the results of experimental and clinical studies of the effect of hypertonic solutions on cerebrospinal fluid pressure, absorption of the fluid and on brain volume. By animal experiments (carried out in collaboration with Dr. Tracy Putnam, a report of which was published in the *American Journal of Physiology* **53**:464-476 [Oct.] 1920) it was found that gastro-intestinal doses of hypertonic solutions were effective in reducing the pressure of the cerebrospinal fluid and diminishing the volume of the brain. The solutions were as effective by this route as when given intravenously. The medullary depressant effects of intravenous doses were avoided by this route.

In an extension of this work other experiments, in collaboration with Dr. Bailey, were undertaken in an attempt to analyze the details of the mechanism by which the changes were produced. By occipito-atlantoid puncture the subarachnoid space was connected to a manometer containing a solution of iron, ammonium citrate and potassium ferrocyanid. Following doses of hypertonic salt solutions the manometer showed the usual fall of cerebrospinal fluid pressure. Coincidentally the ferrocyanid solution was displaced from the manometer into the subarachnoid spaces. The later precipitation of Prussian blue from the ferrocyanid solution showed the solution not only to have penetrated the usual channels of absorption—the arachnoid villi and sheaths of the nerves —but it was also found in the perivascular spaces of the brain and within the ventricular system. The deposit of Prussian blue indicated that the solution had passed through the ependymal epithelium of the choroid into the vessels of the plexus.

In order to exclude mere aspiration of fluid due to enlargement of the ventricles, the manometer was connected to a catheter introduced along the aqueduct, thus separating the ventricular absorption from that in the subarachnoid spaces. The volume of fluid absorbed under these circumstances was greatly in excess of any possible volume change in the ventricular system. The conclusion drawn was that the hypertonic solution by increasing the osmotic value of the blood induced absorption of the fluid from the perivascular spaces of the brain. This withdrawal of fluid from the perivascular spaces causes a

retrograde passage of cerebrospinal fluid from the subarachnoid spaces into the perivascular spaces and finally into the capillaries of the brain substance. Also, there is a retrograde passage of fluid from the subarachnoid space to the ventricular system where reabsorption through the choroid plexus occurs.

The same changes were shown to occur in the human subject; a fall of fluid pressure following hypertonic solution was found by measuring the pressure at lumbar puncture; diminution of brain volume was observed in a number of patients who had developed cerebral protrusion following decompression operations. The volume change of the cranial contents, together with the coincident pressure changes, were measured by an apparatus consisting of a water manometer connected to a pressure bag lying under a plaster cast of this region of the head. The protrusions due to lesions obstructing the ventricular system and accompanied by great dilatation of the ventricle showed such extensive decreases in volume that they could only be explained by retrograde absorption

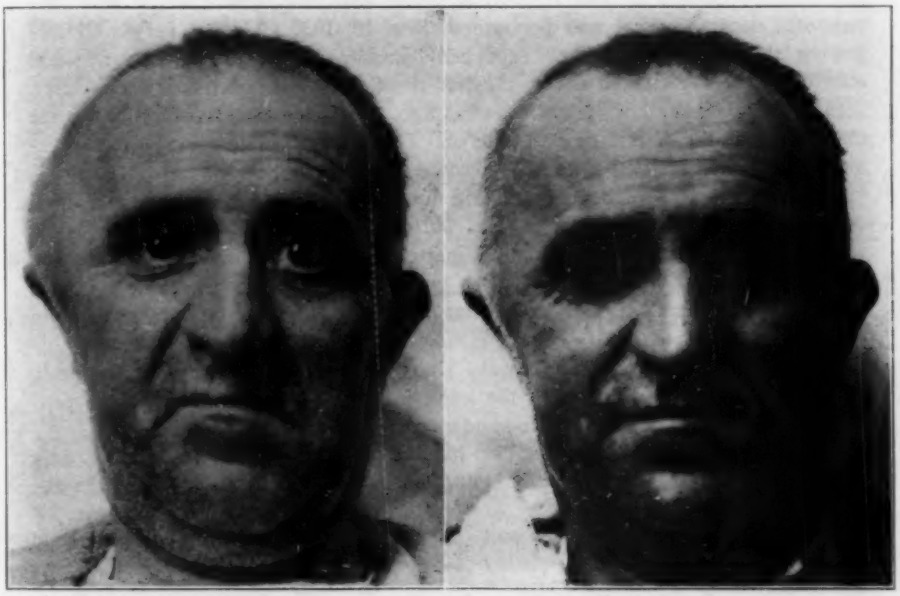

Fig. 1.—Protrusion just before the injection of the hypertonic solution compared with the condition one hour later.

of fluid through the choroid plexuses from within the ventricles. Protrusions unaccompanied by ventricular dilatation showed less extensive volume changes though the pressure decrease was well marked.

The procedure has been employed clinically for the reduction of increased intracranial tension. Photographs illustrative of the results were shown.

DISCUSSION

DR. CUSHING proposed trying out Dr. Foley's conclusions before the meeting by a test case. A patient was shown who exhibited a protrusion through a subtemporal decompression, and in whom an internal hydrocephalus was known to exist. Following the intravenous injection of 15 per cent. sodium chlorid solution, the protrusion completely collapsed (Fig. 1).

A CASE OF MOTOR APHASIA IN A LEFT-HANDED INDIVIDUAL.

Presented by Dr. Cushing.

This patient (Surgical No. 13667), a brain tumor suspect, was shown in view of the question of localization, and to consider whether in left-handed persons the speech center is in the right or left hemisphere. The patient first entered the hospital a month ago with practically no positive neurologic findings except high-grade choked disk and headaches which had been present for a few months. He was accompanied by his brother who observed while here, for the first time, that the patient acted a little peculiarly. He had sent a few checks home for small amounts, but he had made them out on banks in which he had no deposit; an irregularity which in the patient's case was quite abnormal.

As there were no definitely localizing symptoms and as the patient was left-handed, though he had learned to write with his right hand, a left subtemporal decompression was performed, Dec. 10, 1920. He did very well following this operation. The headaches disappeared and there was a rapid subsidence of the choked disk. He left the hospital about three weeks later.

He reentered the hospital a few days ago, owing to aphasia which had come on rapidly in the course of a few days. The area of subtemporal decompression in the interval had gradually become tense.

The patient was presented walking into the room, looking like a normal person, quick and alert in his actions, but could say only, "I don't know," and in his efforts to find words would impatiently snap his fingers and show his concern. He was unable to name the simplest objects, but was able to write with his right hand, though somewhat illegibly, although he wrote his own name freely and well.

Dr. Walton asked how he would sharpen a pencil, and he was given a pencil and a penknife. He took the knife in his left hand to sharpen the pencil—striking evidence of his left-handedness.

Dr. McDonald thought that left-handed people were right-brained only when left-handedness was familial, and not when it was sporadic, as in the case of the patient.

Dr. Bremer said that as a result of his studies of war wounds Marie had come to believe that even in left-handed people the speech centers were in the left hemisphere.

In the patient's case the lesion must be left, for it was apparent to all that there was slight weakness of the right side of the face on emotional movements, and the patient with some difficulty made it clear by pantomime that he felt there was something wrong with his right hand, and held up five fingers to indicate that this had been so for the past five days. The conclusion was that in this left-handed individual, at least, the speech center was in the left hemisphere and the aphasia was of purely motor type.[1]

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1. The patient was operated on Jan. 22, 1921, an osteoplastic exposure of the left hemisphere being made. The dura was under great tension. Intravenous salt solution was given before it was opened. A tense hemisphere was exposed, with marked convolutional flattening. Although palpation revealed no lesion, a needle was inserted on the chance of finding a cyst. At the base of the second left frontal convolution and at a depth of 2 cm. a gliomatous cyst containing 70 c.c. of straw-colored fluid was struck. The fluid was evacuated, completely relieving the tension. Air was reinserted in the cyst cavity and an immediate roentgenogram taken to show the exact situation of the lesion.

A DOUBLE LESION ACCOUNTING FOR AN UNUSUAL NEUROLOGIC SYNDROME. POLYNEURITIS ASSOCIATED WITH A GLIOMATOUS CYST OF THE CEREBRUM. ROENTGEN-RAY LOCALIZATION OF THE CYST BY INJECTION OF AIR.

Presented by Dr. Gilbert Horrax.

History.—E. A. W. A. (Surgical No. 13694), a white girl, aged 9 years, entered the Peter Bent Brigham Hospital, Dec. 17, 1920, complaining of headaches, vomiting and tremor of left hand. The family and personal histories were negative as regards the present illness.

In March, 1920, she became dull in her school work, was irritable, and did not use her left hand so well. One month later she contracted mumps, and after an illness of six weeks the tremor of her left hand became more marked, and she had twitching of the right eye and the right corner of the mouth. She was put to bed, and gradually the left foot began to invert and both feet became weak with the toes in extension. She was taken to a neighboring hospital (Children's) in August, 1920. At that time both legs were almost totally paralyzed, with feet in extension. The deep reflexes were lost at the ankles and knees. There was pain over the nerve trunks in both legs, especially marked in the calves. The right hand was used normally; the left hand was weak and showed marked tremor, with extensive oscillations in attempting to perform any function. The hand had also a static tremor, so that the child had to use the right hand to hold the left one quiet. Impaired sensation to all forms of stimulation was present over both legs, and in addition there was painful hypesthesia over the left hand and arm. Fundi showed at first blurring of the nasal margins of both disks, and later slight choking of the disks. There was left homonymous hemianopsia. The left pupil was larger than the right, and there was marked lateral nystagmus to the right and to the left.

The spinal fluid showed on one occasion 11 cells per c.mm., and on another 13 cells. The blood and spinal fluid Wassermann reactions were negative. Von Pirquet's reaction was negative for human and bovine forms.

The condition was regarded as a polyneuritis. The patient was given braces for her legs, and as the paralysis began to clear up she was gradually able to get on her feet again. She was finally discharged, and told to report at intervals for observation of her eyegrounds.

She reported to the Peter Bent Brigham Hospital in November, 1920, and again in December. At the later date it was learned that the patient had begun to have headaches and vomiting, and had had a seizure which may have been a mild convulsion. Her fundi showed increase in elevation of the optic disks, so she was advised to enter the hospital.

Physical Examination.—This revealed: paresis of the left arm, face and leg, associated with loss of deep reflexes in both legs and the increase of the deep reflexes of the left arm. Both legs were much improved over their condition of four months previously, so far as strength was concerned, as the child could now stand and take a few steps. Tremor of the left hand and arm persisted as marked as before, and similar tremor was present in the left leg.

There were no sensory changes. Nystagmus persisted to the right and left, as did the left homonymous hemianopsia. There was choking of both disks with elevation of 2 to 3 diopters on either side. Pain over the nerve trunks of both lower extremities persisted. The roentgenogram of the skull showed marked separation of the sutures and thinning of the inner table.

The picture presented, therefore, was that of a peripheral lesion of the nervous system, which was clearing up, associated with a central lesion which was getting worse. In view of the advancing choked disks and the left hemianopsia, which could not be explained on the basis of a peripheral disturbance, an exploratory operation of the right hemisphere was undertaken.

This operation disclosed a gliomatous cyst of the right postcentral region. The cyst was largely evacuated, and then filled with air, in order that its extent might be made out by the roentgen ray. Plates taken after the com-

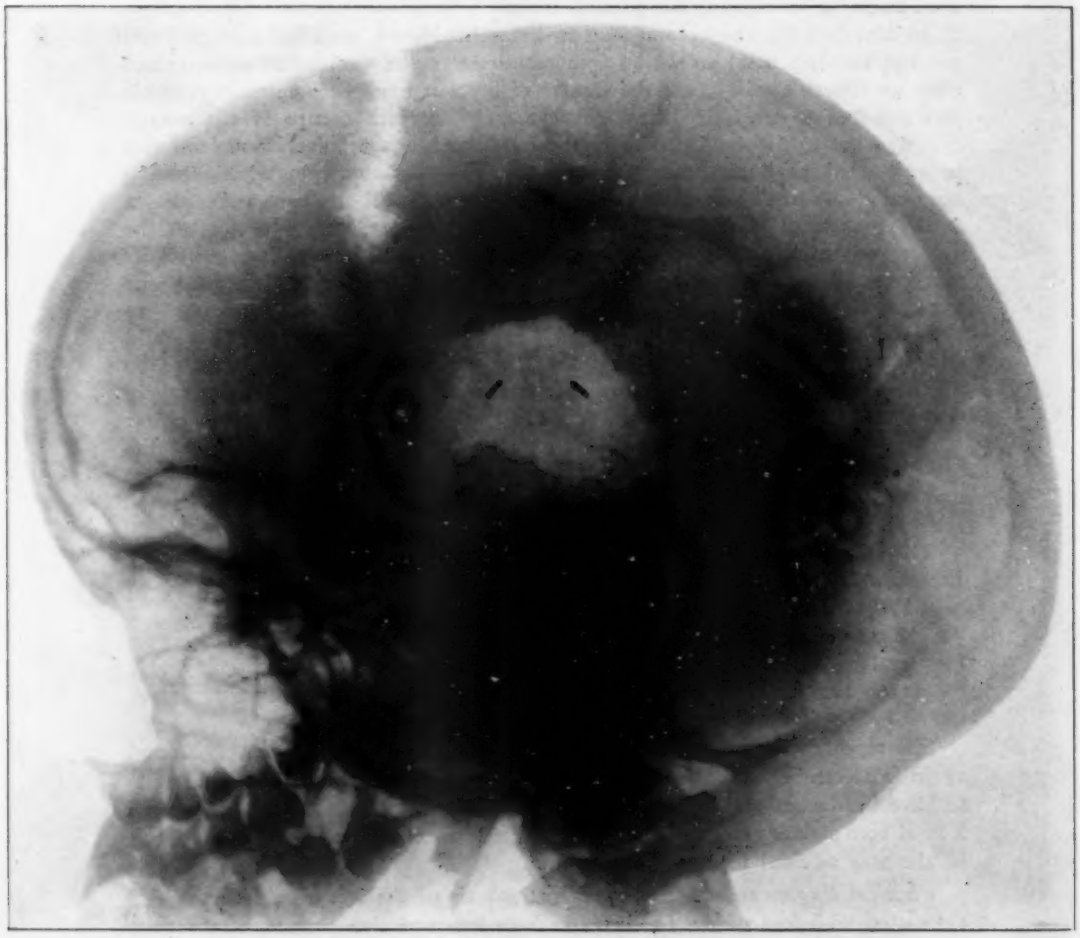


Fig. 2.—Postoperative roentgenogram showing the outline of the bone flap, the anterior leg of which was made in the coronal suture which had been greatly distended. The subtemporal defect is shown by the light area, two silver clips being present in the field. The larger area of the air-containing cyst, measuring on the plate 9 cm. by 5.5 cm., is shown.

pletion of the operation showed a large cyst, running downward and probably inward, about the size of a duck's egg (Fig. 2).

Four days later a second-stage operation was undertaken. At this session the air was evacuated from the cyst, and a good transcortical exposure of the

cyst secured. Its walls were retracted, and at its inferior angle a nubbin of solid glioma was seen, about the size of a hickory nut. This nubbin was removed as completely as possible, and closure made without drainage.

The patient made an uncomplicated recovery, and there was immediate amelioration of all her symptoms. Most noticeable was the improvement in the tremor; the choked disks also subsided. Two weeks after the second operation she was discharged, and was walking about with slight assistance.

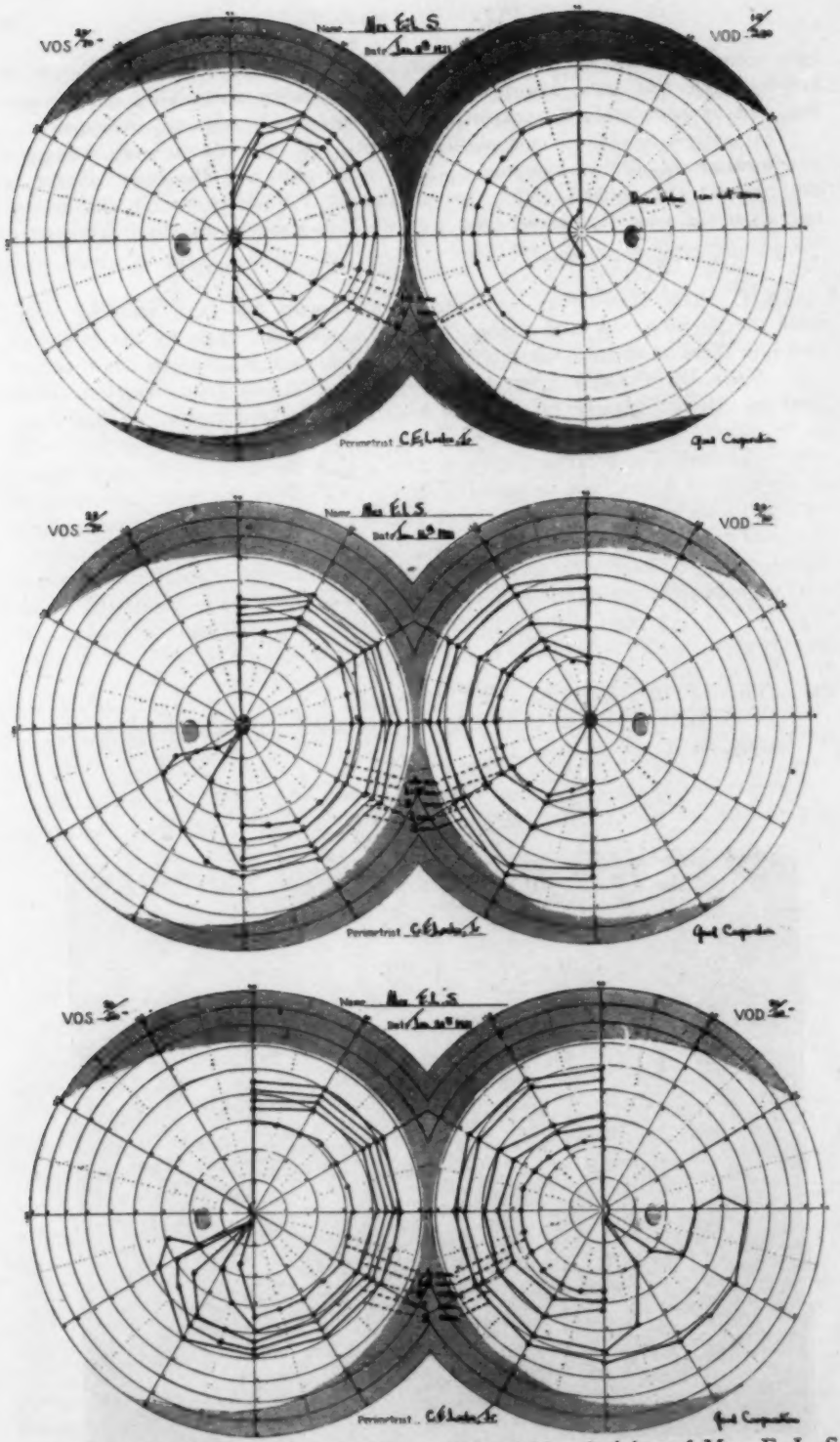
DISCUSSION

DR. CUSHING stated that for some years attempts had been made to determine the position, size and configuration of gliomatous cysts by the introduction into them of various substances which would cast shadows by the roentgen ray. Since Dr. Dandy's interesting observations at the Johns Hopkins Hospital on ventriculography in cases of hydrocephalus and tumor, air had come to be utilized in the Brigham clinic for this same purpose in connection with cysts. Though Dr. Horrax got into the cyst at the first exploration it was at a depth of 4 cm., and it was highly desirable that the exact situation of the cyst, which was evidently a large one, should be determined, particularly if it was to be opened and its walls treated by a fixative in the fashion commonly employed here. In short, it was highly important to determine where the cyst was most accessible to a transcortical incision. It is hoped that some day these cystograms may be taken with sufficient clearness to enable one to determine the situation of the gliomatous nodule on the wall of the cyst.

THE TRANSSPHENOIDAL VERSUS THE OSTEOPLASTIC CRANIAL APPROACH FOR PITUITARY ADENOMAS. Presented by DR. C. E. LOCKE, JR. (by invitation).

Two patients were shown seven days after transsphenoidal operation. Neurosurgeons do not yet agree as to the comparative value of the two procedures.

Fig. 3.—Sella of patient in Case 1.



Figs. 4, 5 and 6.—Perimetric charts of the fields of vision of Mrs. E. L. S. before and after operation.

The idea seems to be prevalent that a transsphenoidal operation is difficult; that is, dangerous from the possibility of meningitis; and that if successful it may be months before there is any definite improvement in vision. It is the experience of this clinic, the only place apparently in which transsphenoidal operations are done in any considerable number, that the reverse is distinctly the case.

It must be clearly understood, in the first place, that a transsphenoidal operation is only suitable when there is a distended sella easily approachable from below. This is a matter determinable by the roentgen ray. When the sella is small and the neighborhood symptoms are obviously due to a suprasellar tumor, an operation from above is undoubtedly necessary.

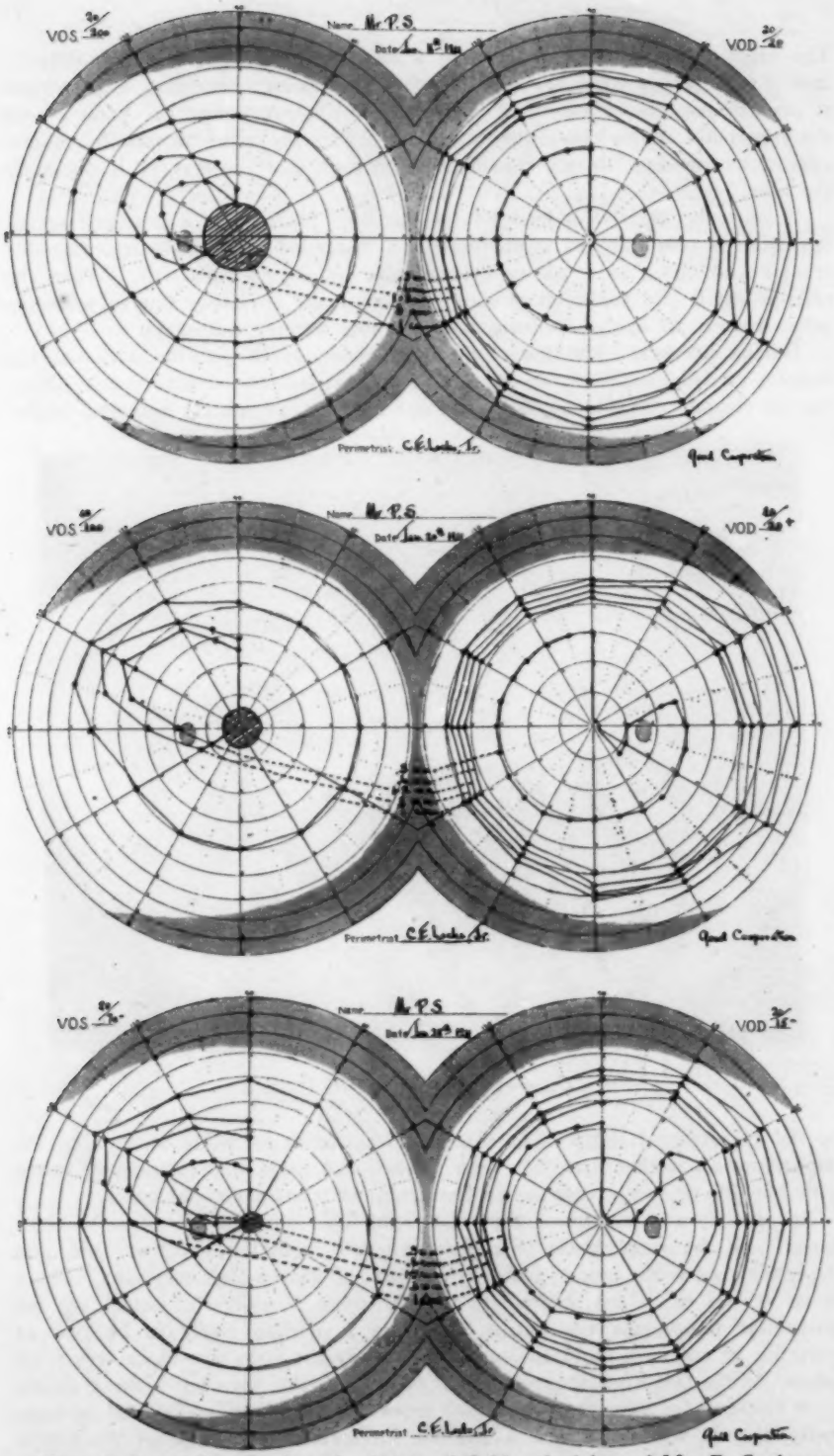
During the year 1920 there have been twenty-seven patients with varying degrees of dyspituitarism of one sort or another associated with tumor affecting the chiasm. Of these, fifteen were operated on through the nose and twelve

Fig. 7.—Sella of patient in Case 2.

by the transfrontal route. There were no fatalities in either series, but the important fact is that there has been marked and rapid improvement in vision with but one or two exceptions in the group of transsphenoidal cases.

In severity and magnitude the transsphenoidal operation is not to be compared with the osteoplastic procedure, whether from the front or side, and the latter even in the best of hands is admitted to have a high mortality. There is no reason to believe, moreover, that granting a successful attack on the intrasellar tumor, the restoration of vision is not so likely to be just as enduring in one case as in the other. Certainly the risks are much less from below. In the last fifty transsphenoidal cases there has been but a single death.

A criticism of the transsphenoidal procedure has been made, and perhaps justly, that it will not reveal a possible intracranial extrusion of the tumor through its dural capsule, a condition which could not possibly be dealt with from below. Leaving aside the possibility and probability that neither can such



Figs. 8, 9 and 10.—Perimetric charts of fields of vision of Mr. P. S., immediately before and after operation.

an intracranial extension of the lesion be thoroughly eradicated by an operation from above, the real answer to this criticism lies in the fact that an extrusion of the tumor through the sellar base into the sphenoidal cells is inaccessible from above. It is a condition shown by the first of these patients.

CASE 1.—Mrs. S. (Surgical No. 13793), aged 60, referred by Dr. B. A Cohoe of Pittsburgh, entered the hospital January 6, complaining of loss of vision. From the appearance of her skin a pituitary disorder might be surmised, but the degree of dyspituitarism was not great. Her basal metabolism on entrance was —6. The chief signs of trouble related to her sella and vision. The sella was of the greatly distended type (Fig. 3), and stereoptically it was evident that it protruded far into the sphenoidal region. Quantitative perimetry, as introduced into this clinic by Dr. Walker, showed a bitemporal defect. With the right eye disks smaller than 1 cm. could not be seen, and there was a central scotoma, vision being reduced to shadows 10/200. With the left eye the 1.2 mm. disk was the smallest the patient could see, vision being 20/75.

At operation a soft adenoma was found completely filling the sphenoidal cells, having burst through the sellar base and dural capsule of the enlarged gland. The cells were completely cleaned of the adenomatous masses (shown to be a chromophobe adenoma by Dr. Bailey). The remains of the distended sellar floor were removed and a large portion, possibly one half, of the intrasellar gland removed. She made a perfect recovery. There is now no nasal discharge whatsoever and from an intranasal examination one would not know that any operation had been performed, the septal mucous membrane being, of course, intact.

Fields of vision were taken on the third day and again this morning (Figs. 4-6). They are widening rapidly, but the chief improvement is in the visual acuity which has increased in the right eye from 10/200 to 20/40. Mrs. S. is anxious to return home. However, before doing so she should have a course of deep radiation with the roentgen ray or a local treatment or two with radium emanations.

CASE 2.—Mr. S. (Surgical No. 13802), aged 52, was referred by Dr. H. L. Sloan of Charlotte, N. C., the chief complaints being headache and loss of vision. The evidences of dyspituitarism were more marked in this case, and his basal metabolism on entrance was —21 with subnormal temperature and pulse.

The neighborhood signs were not unlike those of the first case. The sella (Fig. 7) was greatly widened, with absent posterior clinoids. There was primary optic atrophy. The quantitative fields showed a tendency to homonymous defect (Fig. 8). To the 1 cm.-disk, usually employed alone, the hemianopsia on the right, where vision was unaffected, would not have been apparent, for this was only brought out by the smallest visible disk —0.3 mm. On the left there was a large central scotoma, and disks below 1 cm. were not seen in the nasal fields. The vision in the left eye was 20/200.

The operation, performed seven days ago, was conducted without difficulty. The thin bulging floor of the sella was easily brought into view on removing the anterior wall of the sphenoidal cells. The thin rubbery sellar base was removed, the dura incised, a generous intrasellar removal of possibly the lower half of the adenoma was made (chromophobe struma: Dr. Bailey).

This patient did even better than the former patient. There was immediate subjective improvement in vision in the left eye, and the perimetric charts taken on the third day and again this morning show considerable widening of the fields, which will undoubtedly soon be quite normal on the right, though

on the left less may be expected as the nerve has been far more seriously damaged. Vision, however, has already improved from 20/200 to 20/70—.

Mr. S. is able to go home, but will remain another week for transsphenoidal radiation of the glandular region.

A CASE OF PULSATING EXOPHTHALMOS. Presented by Dr. Yoakam (by invitation).

Though this condition is easily recognizable, it presents an extraordinary picture which makes the unfortunate victims objects of interest and sympathy.

History.—Robert T. (Surgical No. 13799), a schoolboy, entered the hospital, referred by Dr. J. R. Eastman of Indianapolis. On May 8, 1920, when 13 years of age, he was shot by a 22-caliber rifle, the point of entrance being the right mastoid process. He was unconscious for only a few minutes and managed to walk home but was drowsy for twelve hours. On the following day he had palsy of the right side of the face, which cleared in a few days. For three weeks he had severe headaches, after which a subjective bruit developed. This

Fig. 11.—Pulsating exophthalmos from gunshot wound.

was followed by marked exophthalmos, abducens palsy, and great dilatation of the vessels about the right orbit. Thus it took three weeks from the time of the injury for the anastomosis to form (Fig. 11).

Examination revealed the phenomena attendant on an arteriovenous aneurysm, but the communication must be extracranial judging from the position of the bullet just below the base of the skull.

PRESENTATION OF CASES.

The following series of cases from the hospital wards were briefly presented for diagnosis and discussion. Most of them were cases sent in for study as tumor suspects. The method of classifying tumor cases which has been adopted on the surgical service was described: namely, into (1) *tumors verified* by histologic examination of tissue; (2) *tumors not verified,* though undoubted and perhaps even exposed at operation; (3) *tumor suspects* where there may be considerable doubt though the case had been regarded as one of presumptive tumor by the recommending physician.

Case 1 (Surgical No. 13870).—*A patient with undoubted multiple sclerosis.*

It is hardly conceivable that a case of this kind, particularly in the absence of choked disk or other pressure symptoms, should even for a moment be seriously regarded as a possible cerebellar tumor. Yet the patient was referred with this diagnosis. The patient showed marked nystagmus and extraordinarily marked incoordination of the extremities, of such degree that gait and station could not be tested. Hypotonia of the extremities was extreme. There was also considerable dysarthria.

CASE 2 (Surgical No. 13851).—*A patient with focal epilepsy, brain tumor suspect: presumably endothelioma.*

The patient, a man aged 41, gave a history of generalized severe headache for the past twenty years. Two months before admission he awoke with a feeling of weakness and awkwardness in his left hand. A few days later he had a typical jacksonian attack beginning in the left hand. There had since been four similar seizures but never with loss of consciousness. For the past ten days there had been frequent minor attacks of numbness limited to the hand. The reflexes on the left were slightly exaggerated. There was no choked disk. The roentgen rays showed no change in the skull.

Even in the absence of objective evidences of pressure this was unquestionably a tumor, and if we are to regard the headaches as occasioned thereby it was probably a benign lesion and possibly an endothelioma. However, were this so one would expect some evidences in the skull, either a point of thickening (endostosis) or dilatation of the diploetic vessels.

[This patient was subsequently operated on and a postcentral glioma disclosed. The lesion was enucleated. A defect exactly corresponding to its position was then made in the bone flap before its replacement. Deep radiations (roentgen) were subsequently given in the direction of the lesion, through this defect.]

CASE 3 (Surgical No. 13833).—*A cerebellar tumor suspect: illustrating the effect of pregnancy in accelerating tumor growth.*

The observations on mouse tumors have shown that at the termination of pregnancy there may occur a marked increase in the growth curve of these lesions. This observation may perhaps explain why it is that the onset of so many cases of brain tumor in women appears to coincide with pregnancy.

This young woman entered the hospital on January 13. Last July when eight months along in her first pregnancy, she noticed dizziness on turning suddenly. She had been vomiting throughout the entire period though she had been without headache. Later in July progressive loss of hearing on the right was observed. Soon after parturition, which was normal, she noticed numbness of the right side of the face, and occasional numbness of both arms; in September, unsteadiness with swaying to the right. Early in December, stiffness of the neck and severe headaches came on and choked disk was observed.

Examination.—The positive findings were: Choked disk of 5 diopters with typical chrysanthemum nerve head; nystagmus more marked to the right; static instability with deviation to the right; incoordination chiefly in right leg and arm; lowered reflexes with hypotonia on the right; hypesthesia of the right trigeminal skin field; suboccipital tenderness; lowering of auditory acuity on the right.

Though she did not have a typical history, the patient was naturally an acoustic tumor suspect.

[She was operated on January 24. The usual bilateral suboccipital exploration was made. The ventricle was punctured, revealing hydrocephalus. No tumor was disclosed though the search in each recess was carried to the region of the pons. There was a large posterior cistern with a thickened grayish wall, and the case may be one of chronic arachnoiditis. The choked disk subsided rapidly and she was discharged much improved. The diagnosis remained "Cerebellar tumor: not verified."]

CASE 4 (Surgical No. 13783).—*A brain tumor suspect: presumptive diagnosis of cerebral arteriosclerosis and thrombosis.*

It was stated in regard to this patient that one cannot be certain of the diagnosis of tumor or nontumor without operation or necropsy. A workingman, aged 49, with a presumptive history of syphilis and with advanced chorioretinitis in one eye was admitted to the surgical wards on January 4. He gave a history of having been well, except for loss of vision in his left eye, until three weeks before entrance. He awakened one morning with severe left-sided headache. In the course of forty-eight hours there had come on a spreading paralysis of his right side, beginning in the arm and becoming complete. At the same time there was marked aphasia. His condition was such that the sole source of the clinical history was a relative. He had obvious arteriosclerosis, and there were no evidences of his having any special grade of intracranial pressure and no history of headaches. His eyegrounds were negative except for some possible haziness of the nasal margin of the left nerve head, a condition considerably obscured by the extreme degree of patchy pigmentation throughout the retina. His blood was negative, but the Wassermann reaction of the spinal fluid was positive in 1 c.c.

In commenting on this case, attention was drawn to the tendency on the part of the hospital physicians to make, when possible, a presumptive diagnosis other than tumor, whereas the reverse was the natural tendency on the part of the surgical staff.

A patient with a closely similar history had, shortly before, been on the medical service with the diagnosis of cerebral thrombosis in the absence of choked disk. The patient died and came to necropsy. The clinical history was used in Dr. Richard Cabot's third-year exercise, and both he and the class arrived together at the diagnosis which had been made in the wards during life. The necropsy, however, disclosed a large glioma.

This experience shows that it may sometimes be difficult to distinguish tumor and thrombosis, but nevertheless, the latter is the more preferable diagnosis in this case, and treatment for syphilis will be instituted.

[The patient shown at the meeting as a presumptive vascular case, some days later became deeply stuporous and a reexamination of the fundus showed that there was definite swelling of the left nerve head of about 2 diopters. Under local anesthesia, on January 17, a left subtemporal decompression was performed by Dr. Locke, revealing great tension. He made a good recovery and regained consciousness. On February 5, Dr. Horrax made an osteoplastic exploration, revealing a large apparently enucleable tumor of the postcentral area. Five days later this tumor, which proved to be a neuroblastoma, was enucleated. This led to prompt improvement in the paralysis and the faculty of speech was entirely regained.

The experience well illustrates the reason why we have come to keep a separate list of brain tumor "suspects."]

BOSTON SOCIETY OF PSYCHIATRY AND NEUROLOGY

Regular Monthly Meeting, Feb. 17, 1921

JOSEPH W. COURTNEY, M.D., *in the Chair*

ANATOMIC FINDINGS OF GENERAL PARESIS AND MULTIPLE SCLEROSIS IN THE SAME CASE. DR. SOLOMON C. FULLER.

Dr. Fuller discussed an association of typical cerebral lesions of paresis with multiple sclerosis lesions, the question being whether there was an actual combination of paresis and multiple sclerosis or whether the multiple sclerotic areas were manifestations of a disseminated nonparetic syphilitic process.

A woman, aged 47, presented definite indications of paresis both mentally and physically and also certain signs strongly suggestive of multiple sclerosis. For a greater part of the time toward the end of her illness she was apparently obliged to use crutches; on occasions of excitement and euphoria she was able to discard them and even to run. This had led to the supposition, on the part of her friends, that her disability was more imaginary than real. Histologic examinations of the cortex showed alterations typically paretic. Preparations of the chiasm, oblongata and cord showed disseminated sclerotic areas indistinguishable from the typical lesions of multiple sclerosis. A careful search failed to reveal spirochetes.

DISCUSSION

DR. H. I. GOSLINE asked whether Dr. Fuller had considered the possibility that these changes in the spinal cord which show no sign of inflammatory process may be later stages in the natural history of the syphilitic process.

DR. S. C. FULLER replied that it might be possible. The late stages of a multiple sclerosis are indistinguishable from any chronic encephalitis with fibrous replacement. However, no fresh multiple sclerotic lesions were encountered in this case.

A CASE OF HENSCHEN'S NODES. DR. JOSEPH W. COURTNEY.

In 1881, Henschen wrote a paper on migraine in which he stated that 106 out of 140 patients showed nodes or nodules scattered about either in or under the skin of the arms, neck and scalp. Dr. Courtney said that for a long time he had been looking for such nodules and had found them in only one patient, whom he exhibited. She had had classic migraine for many years. A year or more ago she noticed nodules under the skin, in the arms and sternal region but none in the scalp or neck. They were more sensitive at some times than at others.

DISCUSSION

DR. E. W. TAYLOR thought this interesting in connection with Auerbach's observation of what he called "nodular headaches." In many cases of headache, he had observed nodules in the muscles about the neck and shoulders, which were rather easily removable by massage. Such headaches he sharply distinguished from those of the migraine type.

PERIPHERAL NERVE INJURIES TREATED AT THE MASSACHUSETTS GENERAL HOSPITAL. DRS. W. E. PAUL and C. A. PORTER.

Dr. Paul reviewed 188 cases, from 1878 to 1918, involving fourteen nerves injured singly or in combinations and including brachial plexus injuries. Of these, ninety-five had a record of end results. The pioneer operation was

done in 1878 by the late Dr. C. B. Porter—a primary suture of the ulnar and median above the elbow. The operative wound suppurated, as did most of the nerve sutures in the preaseptic days. The injuries showed thirty-four kinds of trauma or conditions and twenty cutting agents were specified, glass predominating. Nerve inclusions occurred in three forms. The nerves most frequently cut were ulnar, 31 cases; median, 18 cases; ulnar and median, 12 cases; musculospiral, 8 cases; external popliteal, 4 cases. In operations various methods were used to approximate nerve ends and favor healing. Excision of portions of long bones was twice practiced. Frequently the sutured nerve was wrapped in Cargile membrane, or fascia, or fat or muscle. A vein was used to guide growth over a gap. Heterotransplants and autotransplants were resorted to. Implantation of a neighboring nerve was done. Gaps were bridged with strands of silk, etc. Several patients were operated on more than once.

Males were found to preponderate in numbers injured. There were ninety-five cases with a record of the condition one year or more after operation. In the sixty-five suture cases, 41 per cent. failed to improve; 26 per cent. showed slight improvement; 30 per cent. showed considerable improvement; one patient (1.5 per cent.) was stated to have completely recovered. In the thirty neurolysis cases, 40 per cent. showed no improvement, 23 per cent. slight improvement, 20 per cent. considerable improvement, 16 per cent. complete recovery. These studies, though giving little help in treatment, demonstrate how much repair is required for complete restoration of function following suture of a divided nerve. Surgical and neurologic opinion seems to be settling on three apparently sound factors essential to repair that shall restore function: (1) accurate apposition by end-to-end suture of the central divided end to its former glial pathway peripherally; (2) a technic to avoid meddlesome handling of the nerve and eliminate postoperative fibrous tissue growth or clot at the nerve junction; (3) methods of suture to minimize operative trauma.

Dr. C. A. Porter stated that up to the time of the war, there had been no one who had had a large experience in such civil surgery as most of the patients came to the hospital with a history of having been previously treated by some emergency surgeon who, not infrequently, sewed up the tendons omitting to suture the nerves, or sutured the nerves with chromic catgut, silk or big needles. In such injuries as badly cut wrists, unless adequate experience and proper surroundings were available, it would be advisable to stop the hemorrhage, render the wound as clean as possible, dress with a sterile dressing and send the patient to the nearest competent surgeon to deal with the nerve injury. This applies particularly to injuries of the ulnar nerve which presides over the fine movements of the hand and fingers. It is doubtful whether a primary suture of the ulnar nerve ever results in perfect motor and sensory return, and it is almost sure that a secondary suture never so results. When there has been a considerable lapse of time between the injury and suture, a varying degree of contraction, deformity and degeneration invariably preclude complete restoration of function. Even when there has been perfect healing after primary suture and the patients have had regularly the kind of after-care which they obtain in the outpatient department, the result, when tested carefully, is never perfect.

The sciatic nerve, on the other hand, presides over rather gross movements and comparatively unimportant sensations, so that when the toe drop is corrected, it is surprising to see how well these patients can walk. When the sciatic nerve or its branches have been divided or a tumor excised, it is often

difficult to bring about end-to-end union without undue tension. Much can be gained, however, by proper, long continued position of the limb. The higher the suture and the larger the defect, the longer should the limb be immobilized.

A severe injury to the brachial plexus, of all peripheral nerve lesions, requires the nicest judgment as to what should be done. In a total of twenty-seven personal operations, only one has given satisfaction, and this was a comparatively poor result although the patient had been treated as a private patient by one of our neurologists for over three years. As a five-year end result, she could flex her arm, wrist, fingers and thumb. The lesion was originally complete, and the operation was a combination resection end-to-end suture and lateral anastomosis. In almost all of the other cases, in spite of endeavors to put sound nerve to sound nerve, the results have been lamentable and have almost always ended with shoulder amputation. In a small number of these cases, on account of persistent pain, posterior nerve-root division has been necessary. Of these patients only one was cured, the failures probably being due to inadequate division. Dr. Porter advised resection of the roots from the third cervical to the first or even second dorsal. If only the roots of the brachial plexus proper are divided, there is invariably a return of pain.

In regard to Volkmann's paralysis, among the patients operated on, two or three clearly showed that in addition to marked atrophy and fibrosis of the muscles, there was a definite lesion of the nerve as well, and in one case, above a point of constriction, a definite neuroma had formed. When the involved muscle has become functionless, no matter whether nerves could be freed by operation from scar tissue or united, the only hope of improvement is by transplanting normally innervated tendons.

In the after-care it is vitally important that the paralyzed muscles be relaxed, as in general one finds that the normal muscles have, sooner or later, brought about contractions most difficult to overcome. Massage and galvanism should be employed to keep up the muscle tone and nutrition, and the finer the function of the nerve, the greater the importance of this after-care.

All are agreed that the musculospiral nerve with comparatively gross function is the one which recovers most quickly and satisfactorily. In many cases neurolysis, after fracture in the middle of the humerus, has proved curative, and, if in doubt, should be tried without resorting to resection. After thorough freeing of the nerve, which should always be commenced from above and below, thus approaching the site of the lesion, the nerve may be stretched, as a nerve with moderate traction will stretch from one-half to one inch, but little or nothing can be gained by pulling the distal end upward. As one's experience increases, however, and the dissection upward is more freely prosecuted, if the adjacent joints are properly relaxed, one can usually obtain an end-to-end suture in the average lesion.

Little advance has been made since 1885 in the actual technic of suture, though probably today the majority of surgeons use absorbable material. Experience has shown the importance of delicate handling of the nerve, of the necessity for absolute hemostasis and the advantage of avoiding rotation in suture in order to maintain the original nerve tract pattern.

Before the nerve is freed, it is flat in the majority of cases rather than round and composed sometimes of many nerve bundles rather than a single cable. Almost without exception there is a good sized bulb on the proximal end, while that on the distal is either much smaller or sometimes absent. Usually a little fibrous cord connects the bulbs. With the wish to remove as little as possible of these bulbs in order to be able to suture end to end,

the human tendency is to inadequate excision of the proximal neuroma. Dr. Porter believes, owing to this error, that many nerve sutures are doomed from the start, and would strongly urge section after section with a fine, very sharp knife until motor nerve cables can be clearly demonstrated. Probably little harm results from placing one catgut stitch through the center of the nerve to approximate the ends grossly, but on this authorities differ. The rest of the suture should be done with very fine chromic catgut or very fine silk, the sutures being placed through the nerve sheath in such a way that the down-growing fibers are directed into the distal end and cannot mushroom out through the suture. This effect, which is not desired, is sometimes produced by drawing the central single stitch too tightly. Dr. Porter believes that the introduction of any foreign body is contrarily indicated. Some physicians have advocated surrounding the suture by fat or fascia lata.

The main question involved is not the technic of the placing of a few sutures to approximate nerve ends, but a question of experience and judgment in selecting the best procedure in any given case. On the other hand, the surgeon must constantly bear in mind that the vital point of perhaps a two-hour tedious operation is the ultimate nerve suture which in itself may not require more than ten minutes.

DISCUSSION

Dr. J. B. Ayer spoke of a patient whom Dr. Porter operated on about 1911. In this case he had a chance to examine the tissues. The patient had been cut by a piece of glass and a neuroma about the size and shape of a pecan was excised. Histologic examination showed that he did not get above to perfectly normal nerve, as there was a good deal of fibrous tisue at the proximal end. About one-half to one-third of the fibers ran through to the distal end. After resection he could not unite the ends, and there was an inch gap filled in with several silk sutures and surrounded by Cargile membrane. About three years later the patient was able to use all of her ulnar muscles. Sensation had returned to a considerable extent although of a protopathic rather than epicritic type. Dr. Paul would agree that there was not complete regeneration, but it was a very useful hand. This result was obtained under conditions which Dr. Porter has said are the worst: namely, the nerve affected was the ulnar, and the gap bridged was a considerable one.

Dr. E. W. Taylor remarked that nothing had been said of the method of regeneration of divided peripheral nerves, whether solely from the proximal end or whether in part, at least, from the neurilemma sheaths of the peripheral end. This matter, long in dispute, is of practical importance in connection with the time of suture after the injury.

Dr. G. L. Walton remarked that in view of the "fumbling period," when various devices were tried for regenerating nerves at a distance, it was a great satisfaction to have established the realization that such efforts may be discarded, and that there is little or no result to be expected unless there is absolute apposition of the cut ends.

Dr. Percival Bailey had recently seen Dr. Dean Lewis's work in Chicago, and felt that it was necessary to have an absolute end-to-end anastomosis without tension if results were to be obtained.

Dr. Stanley Cobb spoke of his work under Dr. Frazier in General Hospital No. 11. In six months about 175 patients with peripheral nerve wounds were treated, and the rule was to wait until three months after the last sign of

infection in the wound. That frequently meant waiting until six or nine months after the original injury. On making then an end-to-end anastomosis, it was found that regeneration would at once begin as though the operation had been done immediately after the injury, which is evidence in favor of the theory of central regeneration only.

Dr. J. W. Courtney called attention to the fact that the electrical excitability of sutured nerves is an absolutely unreliable index of their functionability. He spoke of a young man in whom the left ulnar had been partially severed by a pen-knife. Dr. Porter had done a very careful and successful end-to-end anastomosis. In spite of the slow but steady regeneration of muscles and return of function which followed the nerve anastomosis, neuromuscular electrical excitability remained practically at the zero point for considerably more than a year from the date of operation.

Dr. W. E. Paul, in answer to Dr. Taylor's question, stated that the authorities seemed to be in favor of the central regeneration theory. It is interesting to realize that the degenerative changes in the peripheral segment of a divided nerve include the disappearance of the parenchymatous tissue of the nerve.

CHICAGO NEUROLOGICAL SOCIETY

Regular Meeting, Jan. 20, 1921

G. B. Hassin, M.D., *President, Presiding*

ELSCHNIG'S TYPES OF PHYSIOLOGIC DISKS. Dr. E. V. L. Brown.

In the little read (and unfinished) encyclopedia of ophthalmology edited by O. Schwarz, Elschnig of Prague has attempted a classification of optic disk into types based on the amount of connecting and supporting tissue in the nerve trunk. When there is a large amount of this tissue the bundles go straight forward, parallel to a point well anterior to the inner surface of the sclera, then diverge abruptly, almost at right angles and go over into the retina, leaving only a shallow funnel in the center with none of the lamina cribrosa visible at its bottom. The vessels come well forward with the supporting tissue and divide on the surface. This is his Type 1. In Type 2 there is less connective and supporting tissue (pial and glial), and a narrow cylindrical excavation takes the place of the funnel, and the vessels divide as before on the surface. In Type 3 there is marked lack of tissue between the bundles, nothing supports them in front of the lamina cribrosa, they no longer run parallel any distance after they go through the holes in the lamina cribrosa, and they bend away in all directions from the central axis of the nerve trunk and come to lie along the wall near the edge of the scleral canal. This leaves the wide gap or "cup," called a large physiologic cup or excavation. On the temporal side the bundles go only a short way (some 3-4 mm.) to the macula, and these few nerve fibers are spread over five-twelfths of the circumference of the disk, at that, so the amount of tissue between them, too, is small, and the cup comes to be especially large in the temporal part of the disk, on the side of the macula. The artery and the vein both divide on the floor of the

cup. In Type 2 or 1 only the vein divides on the floor. A large amount of lamina cribrosa is exposed to view. This, in the main, explains the plan of the classification.

Any man or any group of men who regularly try to "type" the nerve heads they see will, in Dr. Brown's opinion, find the classification tenable and will find that it adds a great deal of interest to the study of a disk. Its prime value lies in the training it gives. But, if one learns to differentiate between a Type 2 and a Type 3 disk he will never make the error of calling a disk with a large physiologic cup an "atrophic disk." This is quite frequently done by doctors who, Dr. Brown said, he felt had never really seen anything interesting enough about a disk to make them study it intelligently.

DISCUSSION

DR. HUGH T. PATRICK asked whether the different disks and cups made any difference in the appearance of pathologic processes; whether a choked disk would be less obvious in Type 3 and would be later in showing itself. The cup would fill up more slowly, and he wondered whether it would make any difference in the time when an optic neuritis or glaucoma might be recognized.

DR. RALPH C. HAMILL said that in London the neurologists spoke of the swelling of the nasal half of the disk. He asked whether the ophthalmologists consider that there can be a swelling of the nasal half with a fairly good cup.

DR. PETER BASSOE asked whether Dr. Brown could lay down some rule whereby one could distinguish the temporal pallor in multiple sclerosis from various normal types of disk. He recalled many cases in which he thought he saw this pallor, and would have to admit that had he seen a similar disk in a person without any organic disease he would have passed it up as some variation in the disk, which was scientifically dishonest.

DR. BROWN, replying to Dr. Patrick's question as to the incipient stage of the organic atrophy, said he did not think it would make any difference, because the cup was probably less than 0.5 mm. wide. If there was any edema, which was the recent way of looking at all papillitis cases, it would progress across this 0.5 mm. very soon. In the physiologic cup the disk never goes to the very edge. There is always the intervening wall of nerve tissue, even when it is as thin as was shown in the illustration of Type 3. The glaucoma cup always reaches to the edge of the disk at some one point; it may not be for more than one-twelfth of the circumference, but when one is differentiating between the glaucoma cup and the large physiologic cup the course of the vessels settles the question.

Dr. Brown thought the relatively small amount of the nerve tissue that goes to the temporal side in comparison with the amount that goes to the nasal side answered Dr. Hamill's question. Gowers was the first to point out that choked disk and neuritis begin on the nasal side, and that one could have choked disk that involved only that portion in which the tissues were the densest. The surface of the disk and the macula often differ as much as three diopters, 1 mm. Dr. Brown took a section of a disk to Professor Graeffein, Berlin, and asked him whether it was high enough for a choked disk, but could not get him to say that it really was a normal or a pathologic disk. There can be great variation in the height of the disk. The clouding can usually be seen first on the nasal side.

The most characteristic thing about multiple sclerotic atrophy is that in one eye it may be the superior quadrant and in the other eye another quadrant,

perhaps the inferior quadrant. The atrophy of tabes is regularly more in evidence on the temporal side.

Dr. Brown thought that Dr. Bassoe brought up the point which settles in the main the question as to whether or not the atrophy goes to the edge of the disk. In the patient presented there was a well colored but narrow wall of nerve tissue temporal to the cup. If this patient should develop a temporal pallor, there would be a small amount of tissue involved. There was no end to the amount of dispute regarding the pallor of the disk on the temporal side.

TUMOR OF THE LEFT BASAL GANGLIONS AND CEREBRAL PEDUNCLE. Dr. Ralph C. Hamill.

Mrs. B., 44 years of age, entered Wesley Hospital in June, 1920. Family and previous histories were uneventful. In the summer of 1919 conduct changes were noted. She wanted to take out a great number of insurance policies. Shortly after this she began to have vomiting attacks, with and without headaches. Early in 1920 weakness, gradually developing into paralysis, of the right arm and leg was observed so that by June she was unable to walk. Shortly before entrance she began to have difficulty in finding words and involuntary micturition appeared. At the time of entrance there were slight anemia, normal urine, negative blood and spinal fluid Wassermann reactions, 27 cells.

July 30: Voluntary movements of the upper part of the face were good and equal. The right lower side of the face was paretic, more marked in emotion than volition. The motor fifth was normal, the right corneal reflex diminished. The right eye turned slightly down and in, yet there was no true paralysis. Occasionally there was slight forced movement of the eyes toward the right and possibly paralysis of upward movement of the right eye. There was paresis of the right arm and leg with increased tonus and loss of the sense of passive movement of the right hand. Attention was poor, hence sensory changes were difficult to determine. She seemed to hear better with the left ear. There was marked bilateral choked disk. The patient lay in a semistuporous condition, seldom speaking, and then only in monosyllables or short sentences.

August 4: The patient lay quietly, almost never speaking. She ate when fed, answered simple questions, smiled rather easily, but attention was very poor and she made no attempt to follow any but the simplest instructions. Memory seemed good so far as it could be tested. There were occasional signs of perseveration. The left side of the face tended to smile as soon as she started to speak. It was impossible to make her cry though pin pricking brought tears. She had no anosmia. Marked bilateral optic neuritis, with small hemorrhages, was present. There was no evidence of hemianopia. She tended to keep the left eye closed (apparently to avoid double vision). The right eye turned down and in, though it could be abducted to the outer canthus. There were less upward and downward movements than five days before. Lateral movements were good, though there was slight nystagmus, greater in the left lateral position than in the right. The pupils were irregular and reacted poorly to light. It was impossible to determine reaction in convergence. The motor fifth was normal. The right corneal reflex was decidedly diminished, and slight hypesthesia over the right cheek and forehead was suspected. The right side of the face was paretic, slightly above, more below, more marked

in emotion than volition. She appeared to hear a whispered voice normally. The functions of the ninth, tenth, eleventh and twelfth nerves were normal. The right arm was sharply flexed at the elbow and adducted. The fingers were clenched. She performed all but the finer movements with the fingers and hand, but only with marked effort and very slowly. There was practically no spontaneous movement of the right arm or leg; there were resistance to passive movements of the arm but not of the leg. She seemed to feel pin prick normally. The right plantar reflex was strongly extensor, the left doubtful. There was right ankle and patellar clonus. The right abdominal reflex was absent, the left diminished. Arm reflexes were exaggerated on the right, brisk on the left.

A diagnosis of brain tumor was made, localized in the left cerebrum and causing pressure in the region of the anterior corpora quadrigemina, optic thalamus and internal capsule.

August 15: The patient lay in stupor most of the time, though she could be aroused without difficulty. The muscles of the right hand were atrophic and the thumb tended to take the plane of the palm. Still, coarse movements of the thumb and finger were possible. In the midst of the examination she suddenly looked at the examiner and said quite clearly and slowly, "I don't see why you have to bother me at the last."

September 1 she was found by the nurse in coma, which lasted only a few hours.

October 6, the patient was found lying on her back with the head turned to the right. The right eye was partly open, the left eye closed. The eyes, which were held to the right, were constantly agitated by slow movements toward the midline and quick movements toward the right. Occasionally she turned her chin toward the midposition; then with short jerks synchronous with the quick movement of the eyeballs the chin rotated to the right. The nystagmoid movements of the eyes, more marked in the left one, were about ninety to the minute. There was also a fine oscillating tremor of the left eye. The pupils were equal and reacted to bright light. The corneal reflex was lost on the right, diminished on the left. Paralysis of the right arm and leg was complete. The bilateral Babinski sign was present; right ankle and knee reflexes were absent, the left normal. The right wrist reflex was greatly exaggerated. The right abdominal reflex was absent, the left diminished. She seemed to feel pinching everywhere. There was practically no speech.

This conjugate deviation of the head and eyes lasted only for one day and did not return. The patient gradually became worse, developed *snout-krampf* expression and died, Nov. 28, 1920. Throughout the last three months of life the pulse was always over 100. Respirations were usually from 20 to 24. The temperature was normal until the last few days, when it gradually rose to 105 F., with a terminal pneumonia.

The interesting features of this case are the paralysis of upward movements of the eyes, the motor disturbances of emotional expression and the short period during which there was conjugate deviation of the head and eyes toward the paralyzed side. Landouzy reached the following conclusions concerning conjugate deviation of the head and eyes in apoplexies:

1. If the eyes turn toward the side of the convulsing limbs there is an irritative lesion in the cerebral hemisphere.

2. If the eyes turn away from the paralyzed limbs there is a paralytic lesion in the hemisphere.

3. If the eyes are turned toward the paralyzed limbs there is a paralytic lesion in the pons.

4. If the eyes are turned away from the convulsed limbs there is an irritative lesion in the pons.

Sections of the brain of the patient showed a tumor obliterating the normal markings of the basal ganglions from a point a little anterior to the optic chiasm backward to almost the posterior horn of the lateral ventricle, and extending down into the left peduncle to below the level of the anterior corpora quadrigemina. In the center of this mass was an irregular shaped cavity filled with hyalin material. The tumor extended laterally almost to the left claustrum.

Prolongation of the tumor mass into the peduncle and pons, where it doubtless caught the fibers of the cortico-bulbar as well as the corticospinal tracts, probably explains the oculomotor symptoms. This corticobulbar tract, carefully worked out by Déjerine, conveys voluntary impulses from the cortex for associated movements of the eyes and head. In all probability interference with fibers of this tract at any point from the cortex to the cranial nuclei causes conjugate deviation of the eyes and head. In the patient such deviation was a transitory phenomenon marking a sudden exacerbation of the pressure, as is frequently seen in gliomatous tumors of the brain.

The emotional disturbance was probably due to involvement of the thalamic and subthalamic regions, as tumors of vascular disease of this region usually cause some disturbance of the muscular expression of emotion. The paralysis of upward movements of the eyes has been emphasized as a symptom of lesions at the upper end of the aqueduct of Sylvius, including movable tumors of the third ventricle. The symptoms of this nature in this case were doubtless referable to involvement of the region of the anterior corpora quadrigemina.

DISCUSSION

Dr. Hiram J. Smith asked whether the paralyses of ocular muscles in this case were due to the involvement of the corticospinal tract or of the posterior longitudinal bundle.

Dr. J. Elliott Royer thought the nature of the growth an interesting point. He pointed out that tuberculous growths are prone to affect that portion of the brain and have a tendency to be bilateral and grow rapidly.

Dr. G. B. Hassin said that tumors of the cerebral peduncles usually cause an ipsolateral third nerve paralysis associated with a contralateral hemiplegia, though a few cases have been reported in which a peduncular tumor did not give the typical Weber syndrome of hemiplegia alternans superior. In these cases the third nerve was not implicated.

He asked whether in Dr. Hamill's case the corpora quadrigemina were not involved. If so, the symptoms in his patient were due to a central or nuclear lesion of the third nerve. The proper diagnosis then would be a midbrain tumor with subsequent involvement of the large ganglions and of the cerebral peduncles, leaving the third nerve intact. Otherwise it would be difficult to understand how so large a tumor could spare the closely adjacent third nerve if it originated in the cerebral peduncles.

Dr. Ralph C. Hamill, replying to Dr. Smith, said the tumor occupied the ventral rather than posterior surface of the pons. It affected the fibers of the corticonuclear bundles. He could not say as yet whether the posterior longitudinal bundle was affected or not. The absence of the type of nystagmus

usually found in involvement of the longitudinal fibers made it impossible to say definitely whether this bundle was affected or not.

The history of the case emphasizing the early mental symptoms and the vomiting attacks, the beginning hemiplegia and absence of any true paralysis of the cranial nuclei, made it appear that it was rather an involvement of the corticonuclear fibers than of the cranial nuclei themselves.

The tumor was a glioma and extremely cellular. One of the sections showed typical breaking down of the tissue.

OSTEOMYELITIS OF THE SPINE WITH NEUROLOGICAL COMPLICATIONS (WITH LANTERN SLIDE DEMONSTRATION). Dr. Dallas B. Phemister.

This paper will be published in a later issue of the Archives.

DISCUSSION

Dr. Peter Bassoe said the second case reported by Dr. Phemister was of the greatest interest to him. He had never had a case like it before and considered it fortunate that they were able to make a diagnosis and have the patient operated on before the spinal canal was affected. When he called Dr. Phemister to see the patient, which he did at once, he saw that the condition was not meningitis. The striking thing about the case was the tremendous hypersensitiveness and the way the patient resisted all handling of the pelvis and the right leg; the septic fever with chills, the high temperature and high leukocyte count were also prominent features. Dr. Phemister was certain that they were dealing with osteomyelitis, but whether it was in the pelvis or spine could not be determined until the roentgenogram was taken.

Dr. Bassoe thought there were many cases of arthritis of the spine for which laparotomies had been performed, and in this case of osteomyelitis an able surgeon had operated for appendicitis. Recently Vanderhoof has reported a number of cases of spondylitis and arthritis of the spine with very misleading symptoms and resulting useless operations for supposed appendicitis or gallstones.

Dr. A. B. Yudelson asked in what percentage of cases of osteomyelitis elsewhere is osteomyelitis of the spine a complication later in life. Dr. Phemister had mentioned that some degree of ankylosis in the spine is due to myelitis. Dr. Yudelson wished to know whether the ankylosis was due to an actual myelitis, or a metastatic involvement from osteomyelitis in the extremities.

Dr. D. B. Phemister, replying to Dr. Yudelson, said he did not know how frequently osteomyelitis of the spine developed as a complication of osteomyelitis elsewhere, but in the case reported probably 60 per cent. had followed a focus elsewhere. The ankylosis of the spine that developed he believed was due more to involvement of the joints of the intervertebral spaces. Sometimes it would go beyond the bone primarily involved and affect three or four vertebrae, as does tuberculosis of the spine.

In the list of reported cases there are a few in which competent neurologists, most of them German, had diagnosed tumor of the spine, but on operation osteomyelitis was found. In one of these cases it was seen two years after the onset of the symptoms and the symptoms of infection had subsided, as they do in osteomyelitis elsewhere. The effect on the cord is frequently

lasting and permanent paralysis; marked paresis has resulted in some of the cases. Dr. Phemister thought that a good many of the cases of osteomyelitis of the spine have been mistaken for tuberculosis with cord symptoms.

PHILADELPHIA NEUROLOGICAL SOCIETY

Feb. 25, 1921

GEORGE WILSON, M.D., *President*

A NEGRO WITH HUNTINGTON'S CHOREA. Presented by DR. CHARLES W. BURR.

The patient was a man about 45 years old, of mixed blood, with a history of both gonorrhea and syphilis and a ++++ Wassermann reaction. His mother died after suffering with chorea for years. He was unable to give an account of his brothers and sisters. Mentally he showed the childishness of his race and in addition was somewhat demented. He received a gunshot wound in the forehead in 1918, but the chorea antedated the injury. He had marked characteristic movements. There were no signs of gross organic, spinal or brain disease. The interesting point was that of race. Dr. Burr knew of no careful statistics concerning the relative frequency of Huntington's chorea in negroes and Caucasians.

TWO CASES OF MULTIPLE SCLEROSIS. Presented by DR. CHARLES W. BURR.

The first patient was a man concerning whose condition there was a question of differential diagnosis between multiple sclerosis and paresis. He had scanning speech, nystagmus and intention tremor, and negative blood and spinal fluid Wassermann reactions, but the spinal fluid presented a paretic colloidal gold curve. When he first came to the hospital he was demented, but had no delusions. His apparent dementia rapidly disappeared, after which he showed no mental symptoms. A cursory glance at the literature reveals that at least one writer has found the paretic colloidal gold curve frequent in multiple sclerosis, even when there were no mental symptoms of paresis.

The second case was that of a man with multiple sclerosis in whom a partial monoplegia with local convulsions in the left arm followed the intraspinal injection of arsphenamin.

DISCUSSION

DR. ALFRED J. OSTHEIMER said that in connection with the difficulty in differentiating paresis or syphilitic meningo-myelitis from multiple sclerosis there recently have appeared statistics showing that the so-called paretic curve occurs almost without fail in the spinal fluid in multiple sclerosis, so that this factor is not one that can be used in the differential diagnosis. The Wassermann test, however, is a prime factor in the differential diagnosis.

DR. WILLIAM G. SPILLER said that the colored woman with Huntington's chorea, to whom Dr. Burr had referred, had been in his service many times at the Philadelphia General Hospital. She had the disease in a typical form with much mental deterioration. Dr. Spiller said he was not certain whether

Dr. Burr desired to emphasize the greater infrequency of Huntington's chorea in the colored race or not, but there did not seem to be sufficient evidence to support such a view.

Dr. Burr said he had no statistics concerning the frequency of Huntington's chorea in the negro. In his personal experience it was rare. The woman at Blockley and the man he had just shown were the only two that he recalled having seen. There was no doubt that the negro had a genuine case of Huntington's chorea.

THE SIMULTANEOUS OCCURRENCE OF DYSTONIA LENTICULARIS IN TWINS. Presented by Dr. George E. Price, Spokane, Wash.

The following patients were seen Nov. 14, 1919, in consultation with Dr. P. D. McCornack, who kindly placed their histories and his correspondence with their parents at Dr. Price's disposal.

Bobbie and Billie L., twins, aged 3 years, were born at 8 months, their mother being 19 years of age at the time. It was her first pregnancy. The twins were breast fed for six weeks. Both walked at 2 years and 2 months of age and talked at 2½ years. Teething occurred at the usual time. Both had convulsions which commenced three days after birth and lasted at intervals for several days. Bobbie had convulsions again when 6 weeks old. The mother stated that both babies had blue circles all over their bodies until they were 3 months old. About five weeks before they were seen by Dr. McCornack, both babies, during the same night, developed spasmodic, slow, cramplike movements of the entire musculature, except the face. These movements were most marked in the lower extremities. The muscular spasm disappeared after being present for several days, only to recur at intervals of a few days. Sometimes one twin would be affected alone, while at another time they would be affected simultaneously. During the spells there were loss of appetite and sleeplessness, and the children would be quite weak for some time after.

Family History.—The father was in good health. The mother had had attacks of momentary unconsciousness (petit mal) all her life. There was no other history of nervous or mental disease, nor of any condition approaching that with which the children were affected. There was one other child, aged 8 months, apparently normal in every respect.

Examination.—Both boys were well nourished, although they had lost considerable weight in the past five weeks. Both appeared to have deficient eye sight and one (Billie) had distinct strabismus (congenital). Both were mentally deficient. When examined, Billie was free from the spasm while Bobbie was affected. The contracted muscles were in tonic spasm, varying from time to time in intensity and alternating with periods of relaxation, causing a writhing or torsion of the extremities resembling athetoid movements. The tendon reflexes were normal in both cases, and there was no Babinski sign or ankle clonus. The lungs and heart were normal. Dr. F. G. Sprowl reported almost complete bilateral optic atrophy in both patients. The Wassermann reaction was negative. When tested with the galvanic current, the muscles contracted equally at either pole. This reaction occurs in myotonia. Erb's special reaction was absent.

Dr. Price's summary at that time was: An intermittent myotonia or dystonia associated with mental arrest and optic atrophy.

Subsequent History.—The subsequent history was interesting. In a letter the mother stated that on Nov. 18, 1919, while on their way home, Bobbie had an attack on the train. He vomited twice and shortly afterward became unconscious. Muscle contractions, at first mild, started in the face and extended over the entire body. After about an hour the motions ceased, and he lay motionless and apparently unconscious for some time. He then opened his eyes and tried to talk but was unable to do so. For the next few days he was very cross and nervous and took no solid food. In a subsequent letter, written July 19, 1920, the twins were said to be steadily improving, but no statement was made regarding the attacks. In the final report of Sept. 20, 1920, the mother wrote that Billie had had no attacks of the muscular spasm after leaving Spokane, and Bobbie had not had any since Dec. 18, 1919. She further stated that during any sick spell or digestive disturbance there was a tendency to convulsions. Their sight was improving so that they could distinguish objects close to them.

Diagnosis.—The conditions to be considered are hysteria, tetany, epidemic encephalitis and dystonia lenticularis. Hysteria at 3 years would not be impossible, but highly improbable, and could be definitely eliminated by the obvious illness of the children and the electrical reaction. The muscular spasm was not that of tetany. Trousseau's sign and Chvostek's symptom were absent, and the characteristic electrical reaction of tetany was not present. The absence of fever and the entire freedom from symptoms of any kind during the intervals between the attacks would be opposed to the diagnosis of epidemic encephalitis. Moreover, it would be difficult to picture a simultaneous infection with effects limited in each case to a small group of cerebral cells.

The muscular spasm alternating with relaxation simulating athetosis, the myotonic electrical reaction and the presence of marked evidence of arrest, point strongly toward a dystonia musculorum or dystonia lenticularis.

Is it not probable that the basal ganglions had to some extent participated in the general arrest or congenital defect, and that the cells of the putamen were dysfunctioning during the attacks of muscular spasm?

REPORT OF A CASE OF AGENESIS OF CRANIAL NERVES.

Presented by Dr. Williams B. Cadwalader.

This patient presented a little known condition described by Möbius in 1892, under the title "Infantile Nuclear Atrophy."

The absence of function of the cranial nerves in this patient was noted shortly after birth and had persisted. Dr. Cadwalader believed it was due to defect of development of the cranial nerve cells; therefore he preferred using the term "agenesis" of cranial nerves, to distinguish it from atrophy, for atrophy would imply an acquired condition not truly congenital in origin.

History.—J. D., aged 10, was born at full term, the labor was normal and the patient was said to have appeared normal at birth. The mother stated that a few days later, however, the patient's eyes appeared to be "crossed," and she also had difficulty in sucking the bottle because of inability to use the lips properly. About this time it was also noticed that the patient was unable to close either eye completely, and later that the facial muscles could not be contracted normally. These conditions had persisted. In all other respects the child had been entirely normal, and was now robust and healthy. The family history was negative.

Examination.—Neither eyeball could be rotated outward; they both could be rotated upward and downward, but not symmetrically. The pupils reacted promptly to light and in accommodation. Both sides of the face were completely paralyzed. Though this condition was not recognized by the parents until some days after birth, Dr. Cadwalader believed it was present at birth, and he would attribute the bilateral absence of function in the muscles supplied by the sixth and seventh cranial nerves to a lack of development of their cells of origin in the brain stem.

DISCUSSION

Dr. H. Maxwell Langdon said that there was no question that the patient presented had complete bilateral external rectus palsy. There was some weakness of inward rotation in each eye, although it was moderately well performed and better elicited when each eye was tried separately. The eyes were converged about 20 degrees when at rest, and any atttmpt at external rotation to either side caused overaction of the internal recti, increasing the convergence to 35 or 40 degrees. Upward rotation was well but unequally performed; the eyes in this action did not seem to coordinate. At times on upward rotation the right eye would take a higher level; suddenly it would drop, and the left eye would be the higher of the two.

Dr. Weisenberg asked whether she had binocular vision or fusion. Dr. Langdon said he could elicit no diplopia, but he did not know what the vision of the child was, and she might have such poor vision in either eye that in no circumstances would diplopia be produced. Dr. Langdon referred to another child, a girl 9 months old, with complete bilateral external rectus palsy, whom he had recently seen; in that respect this patient's condition was identical with that of Dr. Cadwalader's patient. The child was normal in every way except for the ocular condition. Birth was normal. During the seventh month of pregnancy the mother had had a violent attack of influenza. The fetal movements stopped for about ten days during the height of the illness. It seemed probable to Dr. Langdon that the child had influenzal toxemia which so affected the external rectus nuclei that they did not develop properly. He wondered whether some of the other cases of congenital palsy might not have been caused by some toxemia which the mother suffered during the pregnancy.

Dr. Spiller said that the pathology of nuclear aplasia had been inadequately studied. Möbius, especially, had written on the subject, and Siemerling had had a necropsy of one form of congenital ocular muscle defect (ptosis). The aplasia of the brain may be seen in other structures than the ocular or facial nerves. One of the most interesting forms is complete absence of the visual system, like that found in the case he reported in 1901, and which, so far as he knew, was the only case of the kind in literature. He had observed a young man who had no eyeball in either orbit. The optic nerves, chiasm and tracts were entirely wanting, and yet there was development, although not normal, of the nerves to the ocular muscles.

A PATIENT WITH A SECOND ATTACK OF FACIAL NERVE PARALYSIS: TREATMENT BY A SUPPORTING DEVICE. Presented by Dr. N. S. Yawger.

The case was that of a man aged 34 years, who ten years previously had had a right facial paralysis, at which time the routine treatment of internal medication, massage and electricity was given. The paralysis persisted for five months, and then a contracture developed. Following exposure, on

Jan. 2, 1921, he had another attack of facial paralysis on the opposite side. The patient came under observation two days later, when he presented an extraordinary appearance with his face hanging down heavily on the left and in addition drawn farther out of place by reason of the contracture on the right. Examination showed the paralysis to be complete with reactions of degeneration.

In this patient Dr. Yawger believed a supporting device would be of two-fold benefit—that the support in addition to holding the paralyzed cheek in place, would check the constant pull of the contracture from the opposite side. Dr. Yawger applied his device, and immediately a sense of comfort was afforded; later the patient said he could eat, drink and talk much more satisfactorily, and there was less exposure of the eyeball, which is often a source of great annoyance in these patients. The device was worn about a month, after which the cheek was almost able to sustain itself. The patient recovered within three months from the time of onset of the condition.

Dr. Yawger had not seen the patient in his first attack so that it was not possible to say that both attacks were of equal intensity. However, the second attack was well marked, and, occurring in the same person, it seemed to offer some opportunity for comparison as to the value of treatment with and without support. Recovery from the second attack, in which a support was used, occurred two months earlier than in the first attack; furthermore, the first had been followed by contracture.

Dr. Yawger had observed in this patient and in others that as motion was beginning to return, the implicated muscles became very sore, and he wondered whether this might have any bearing on the question as to whether the seventh nerve carries sensory fibers.

DISCUSSION

Dr. Charles K. Mills said that in a long experience he had seen a number of patients with facial paralysis who had recovered after four or five months, showing no or little improvement before that time. It was difficult to fix the time limit. As to time, he said there were three varieties of facial paralysis: one in which the patient recovered promptly after a week or two or a few weeks; one in which the patient recovered with moderate promptness, but comparatively slowly—usually in from four to six months; and the third class, in which recovery does not take place. Six months was a pretty fair limit for waiting. Dr. Mills thought Dr. Yawger made some remark about transmission of sensation in the seventh nerve and referred to a paper of Dr. Mills. A number of years ago Dr. Mills published a paper on "The Sensory Functions Attributed to the Seventh Nerve." His conclusions after many examinations and a large consideration of the subject and a study of Dr. Ramsay Hunt's papers, was that practically no sensation was transmitted in this nerve. Dr. Mills believed that Dr. Spiller thought that some sensation was transmitted by the nerve. Dr. Mills thought that the sensation supposed to be due to the facial nerve was really due to the fifth, this being extensively distributed closely in relation to the seventh nerve.

THE TREATMENT OF SPASTIC GAIT BY PERMANENT FLEXION OF THE TOES. Presented by Dr. William G. Spiller.

Dr. Spiller presented a boy with great spasticity of the lower limbs. As spasticity of this kind can be overcome temporarily by bending the big toe downward, it had occurred to Dr. Spiller that by keeping the toes partially

flexed, as by a bandage or properly adjusted shoes, it might be possible to make a person with a spastic gait walk in a more normal manner.

The patient dragged his toes in walking. This gait was demonstrated. The feet were then bound with adhesive plaster with a small roller bandage under the toes, so as to keep the toes partially flexed. The result was striking. The boy immediately raised his knees abnormally high. By properly adjusting the degree of flexion of the toes it was possible to make the gait more nearly normal.

When the reflex of defense exists it can be produced voluntarily by flexing the big toe. This movement caused a contraction of the flexor muscles of the lower limbs. It is a well-known law, emphasized especially by Sherrington, that contraction of one group of muscles produces relaxation of the opposing group. By producing a persistent slight contraction of the flexor muscles by keeping the toes properly flexed, it appeared that the extreme spasticity of the lower limbs in extension could be overcome. This method of treatment needs further study. It is a question whether the reflex produced in this manner would become exhausted.

DISCUSSION

Dr. C. K. Mills, in regard to the remarks that Dr. Spiller made about the toe phenomena, wished to say that an old and valued member of this society, Dr. Wharton Sinkler, first pointed out the phenomena which resulted in certain cases from bending the great toe downward. Later some German neurologist believed he had discovered the same thing and published an article to this effect. As Dr. Sinkler described the matter, when the great toe was bent downward the foot was first flexed on the leg, then the leg on the thigh, and finally the thigh on the trunk. It was, in other words, what would now be called a defense reflex.

Dr. Spiller replied to Dr. Frazier that the Stoffel operation would be feasible, but it might not be necessary to do it. If the boy could be made to walk nearly normally by a simple contrivance, that might be better than operation.

A SERIES OF TUMORS OF BRAIN AND CORD SUCCESSFULLY REMOVED. Presented by Dr. C. H. Frazier.

Dr. Frazier presented a series of tumors of the brain and cord successfully removed by operation in the neurosurgical clinic of the University Hospital. The tumors of the brain included:

1. A tumor quite unique because of its diminutive size, measuring in the largest diameter 2 by 3 cm. The tumor was accurately localized and proved on examination to be an endothelioma.

2. An endothelioma removed from the frontal region of a child 6 years old. The tumor measured 10 by 13.6 cm., and was interesting because of its huge dimensions and its gross resemblance to the brain cortex.

3. An encapsulated glioma. This was the first instance in the history of the clinic in which an encapsulated glioma had been found. The patient was admitted with a diagnosis of epilepsy.

4. A large endothelioma of the occipital region, accurately localized, removed in its entirety and without evidence of recurrence four years after the operation.

5. A tuberculoma removed from an adult negro. This was an interesting specimen because of its unusual size and because of the age of the patient

from whom it was removed. Tuberculomas are, as a rule, of small dimensions and almost invariably found in children. In this case the primary lesion was in the kidney.

Of the tumors of the spinal cord there were:

1. An extradural encapsulated endothelioma. The patient was paraplegic, and a diagnosis of transverse myelitis had been made elsewhere and operation not advised. The absence of pain throughout the course of the disease—two and a half years—was a conspicuous feature of the clinical history. Three weeks after the operation, sensation had returned, and the patient was able to walk.

2. An intradural endothelioma. Though present for four years, the patient was still ambulant. The diagnosis was based on the characteristic pain cycle, spasticity and moderate weakness of the lower extremities. The sensory phenomena were represented by pain and hyperesthesia.

3. An intradural endothelioma at the level of the first thoracic segment.

4. An extramedullary endothelioma removed from the cervical segments in a patient who had complete paralysis of both lower extremities and severe pain in the upper extremities. Though no larger than the tumor in Case 2 of this series, there was in one instance a complete paraplegia and in the other only moderate weakness of the lower extremities.

DISCUSSION

Dr. Francis X. Dercum said that the small tumor which was removed from the patient with aphasia and spasm of the muscles of the face on the right side, was evidently partly subcortical. Furthermore, the aphasia was not persistent but only of transient occurrence and brief duration. It could have been due to interference with subcortical fibers. In other words, the speech phenomena may have been due to a diaschisis. The case can hardly be regarded as of localizing value for aphasia.

Dr. Charles K. Mills said he remembered one case he had with Dr. Martin in which a very small tumor in Broca's area produced the symptoms of aphasia. Another very small tumor was removed for him many years ago, by Dr. Keen, from the parietal region. In both cases referred to the growths were a little larger than the one reported by Dr. Frazier. The case of spinal tumor that Dr. Frazier referred to was a most interesting one. The woman had completely recovered; the tumor symptoms were not of a marked character, still they were decisive so far as the location of the growth was concerned. The woman had difficulty in walking and hyperesthesia and other symptoms, which led Dr. Mills to locate it where it was found by the surgeon.

NEW YORK NEUROLOGICAL SOCIETY

The Three Hundred and Eighty-Seventh Regular Meeting, March 1, 1921

Foster Kennedy, M.D., *President, in the Chair*

A PATIENT WITH ACROMEGALIC FEATURES. Presented by Dr. B. Onuf.

Dr. Onuf presented for diagnosis the case of a Jewish boy, 18 years of age, who showed some acromegalic features, but the picture was incomplete, and some manifestations did not tally with those of acromegaly. The hands and

feet appeared acromegalic, as confirmed also by radiographs. There was likewise a slight dorsal kyphosis, and the face was a little large. A distinct prognathism was, however, lacking, and there was no recession of the forehead and no thickening of the supra-orbital ridges. Most unusual, moreover, was the marked asymmetry of the upper extremities, the entire left one, and particularly the left hand, being markedly larger than its fellow and showing some increase of motor power. Another unusual feature, which could not be explained on an acromegalic basis, was a peculiar vascular or vasomotor condition. There was a mottling over a great part of the body and in some regions, particularly in the enlarged extremity, a succulence and increased vascularity of the skin. The mottling varied considerably under influence of temperature and other factors, being at times very marked so as to have first suggested a type of exanthema, at other times being just faintly visible.

Elephantiasis was thought of, but none of the authors who have studied this disease speak of any osseous enlargement of the parts affected; only the cutaneous and subcutaneous tissues are mentioned as the seat of the disease.

The patient alleged that the condition, referring particularly to the enlarged left upper extremity, was congenital, and his mother ascribed it to a maternal impression received while pregnant. While in that state she saw a woman with a very large upper extremity looking similar to that of the patient, and this sight affected her very much. In that connection Dr. Onuf mentioned another case seen by him casually in a business transaction. It concerned a man, about 40 years of age, a banker, who also had one unusually large upper extremity, which, however, showed nothing abnormal aside from its size, as compared with its fellow and the rest of the body, being otherwise well proportioned and of greater strength than its fellow. In this case also a history of maternal impression was given, the mother, while pregnant with the patient, allegedly having been much impressed with the sight of the Statue of Liberty with its one arm raised and holding the torch.

DISCUSSION

Dr. W. C. Brush, in discussion, related a case similar to the one presented by Dr. Onuf, namely, that of a boy of 17 years, who was 7 feet tall. The disturbance was apparently of an endocrine nature and was familial, since one sister was a cretin and another had elephantiasis. In the whole family also the features were asymmetrical.

Dr. L. Pierce Clark said that he was seeing similar cases associated with adolescence. Dr. Walter Timme had told him that it was not uncommon to have these patients improve spontaneously because in time an erosion of the sella allowed for a proper glandular activity of the pituitary gland, but as yet he himself had not been able to verify this teratologic adaptation. He said he would like to ask whether any other systemic symptoms, such as fainting or epileptoid attacks, had been observed.

Dr. J. H. Leiner asked whether the blood pressure differed between the two extremities. Dr. Onuf replied that he did not think there was complete synchrony between the extremities.

BRAIN TUMOR OF THE MIDDLE FOSSA. Dr. I. S. Wechsler.

Dr. Wechsler reported a case of tumor of the middle fossa which was clinically parallel to a case presented at the last meeting. There was transient pain at first on the left side, then it became constant on the right. The first

neurologic examination was negative. The pain was not shooting or typical in any way and was thought to be psychoneurotic. The patient was not seen for two months, during which time the pain gradually diminished, on account of developing anesthesia of the fifth nerve. Meanwhile complete ptosis developed on the right side, gradually receded, and is slight at the present time. At the end of another month there was complete paralysis of the right external rectus. The pain had completely disappeared. The patient vomited once, but never saw double. At one time there was an herpetic eruption in the right corner of the mouth. The deep reflexes were normal, the right possibly a little livelier than the left. All forms of sensation had been lost in the right side of the face, the right side of the tongue and buccal mucous membrane. There were present, corneal anesthesia, keratitis neuroparalytica and beginning ulcer of the cornea. The disks showed no abnormality. Smell was not impaired. Weakness of the facial nerve was noted on the right; the eighth nerve was normal. Roentgen-ray examination of the skull showed normal sinuses; the right clinoid process could not be brought out clearly, there being apparently some erosion, otherwise, the skull was normal. Study at the Mount Sinai Hospital confirmed all the findings. Despite a negative Wassermann reaction, antisyphilitic treatment was given, but with no apparent benefit.

That the case is one of neoplasm of the middle fossa seems probable. The question, however, is whether the involvement is primarily of the fifth nerve, of the brain itself, or of the bone. The condition of Dr. Friedman's patient was very much like this, except that he had a disturbance of smell. Tumor of the bone in the case under consideration is perhaps excluded by the roentgen ray and the fact that the motor fifth is intact. The herpes would suggest involvement of the Gasserian ganglion. Some pressure on the sphenoidal fissure will account for the involvement of the sixth, third and the ophthalmic division of the fifth nerve. Possibly there is pressure on the cavernous sinus, which would account for the recession of the ptosis. The growth probably is not a sarcoma of the bone or glioma of the brain. An endothelioma of the Gasserian ganglion is most probable. A basilar meningitis is not likely to be limited to so small an area. The question of surgical interference is important.

DISCUSSION

Dr. E. D. Friedman, in opening the discussion, said that the transitory character of ocular palsies was not uncommon. Serologic observations on the spinal fluid were lacking. Syphilitic meningitis, however, was rarely unilateral. Operative interference was not urgently indicated since there was no choked disk or other evidence of increased intracranial pressure.

Dr. I. Abrahamson believed we were dealing with a tumor, that the tumor was an endothelioma, rather flat and not encroaching to any extent on the cranial cavity; that in the absence of vital or more pathognomonic signs, an operation might be deferred. Complete removal of endotheliomas in that situation was very difficult.

Dr. Foster Kennedy asked whether the motor fifth nerve had been involved late or early. If late, it was improbable that the case was one of bone tumor; it was probably an endothelioma. If it came from bone an operation would be useless, but if it should be an endothelioma, a time would come when it could be operated on, and the waiting policy would deprive the man of any chance of recovery. Since he evidently showed no involvement of the bone, this would be the time to operate, if ever, or the growth would eventually kill him.

ANALYSIS OF A CONVERSION HYSTERIA SUPERIMPOSED ON AN OLD DIFFUSE CENTRAL NERVOUS SYSTEM LESION.

DR. PHILIP R. LEHRMAN.

Dr. Lehrman pointed out the difficulty of detecting symptoms of hysteria when associated with organic neurologic signs. This combination not seldom appears to be a definite syndrome of an organic nervous disorder. An illustrative case was that of a young woman 23 years old, who came to Vanderbilt Clinic for advice concerning a coarse, irregular, intention tremor of both hands and fingers, which had begun at the age of 12 years, and had progressed unfavorably despite treatment for the past eight years. At one hospital a foot deformity was operated on, and the condition was diagnosed as pronated feet and Friedreich's ataxia. She was almost entirely incapacitated by the tremor. She complained of a great deal of pain of a deep, burrowing character, starting in the base of each thumb and traveling up the forearms to her elbows.

History.—At 2½ years of age she fell off a high chair, following which she stated that she had a left hemiplegia and aphasia which soon improved. Until 12 years of age she dragged her left foot and showed weakness of her right hand. This was regarded by some physicians as residuals of poliomyelitis. Her father and mother were short of stature. The maternal uncle showed tremor of the hands when writing. One sister's deep reflexes were absent. There were no other mental or nervous diseases in both ancestral branches.

Physical Examination.—The positive findings were: height, 4 feet 5 inches; pes cavus; hyperextended fingers at knuckles; toes plantar flexed. Gait showed slight dragging of the left foot. She was unsteady in the Romberg posture. Nonequilibratory tests (f:f, f:n) were badly performed on account of tremor. Dysmetria was present on the right. All deep reflexes were absent. The Babinski reflex was questionable on the right. Muscle strength was absent in the toes, limited in dorsal flexion of the feet, especially on the left, and limited in the upper extremities, more on the left. The Grasset-Bychowski reflex was present. Sensation to touch was diminished in the toes and fingers; the vibratory reaction was diminished in the lower extremities. The right pupil was larger than the left. She reacted peculiarly when a vibrating tuning fork was placed near her ears; the sound seemed to startle her and she would tremble. All other findings were negative.

Mental Examination.—Exploration of the unconscious was resorted to to find evidence of a definite mechanism. The analysis, January to May, 1920, covered a period of about thirty-seven hours of interview. The problems to be solved were: Why did she develop neurosis? Why were these particular symptoms caused, and what was their meaning in terms of the unconscious? The patient's account of her early life in Russia and in America indicated mistreatment by her parents. The father was said to have deserted his family; the mother, however, followed him to America and a reconciliation took place. The patient always hated her father, and he reciprocated this antagonism. She felt constantly abused, thought she might be an illegitimate child, and on the birth of a sister when she was 11 years old, who became the center of the affections of the parents, the patient felt that her surmises were true. Other brothers and sisters had died of neglect. She herself had been injured as a child, purposely, she felt. When the little sister was about 10 months old the patient accidentally dropped her down the stairs. This frightened her for she knew that she would be punished. Her whole body trembled with

fear. The next day she was unable to write at school because of the trembling of her hands. This was the beginning of the tremor.

Her increasingly intolerable position in the home led to day dreaming of Cinderella-like situations in which she would finally be vindicated and taken to a pleasant home by some rich old gentleman. The major part of her narration suggested in tone inflection and phraseology a complaining 12-year old child. From an emotional child, however, she would at times change with striking rapidity into a sneering, ill mannered adult, and would assume an emotional stupidity, a sort of Ganser syndrome on the emotional level. In most respects she lived as a child of 12.

All her day dreams were of the same fabric, that of a suffering personality. It was therefore reasonable to suspect that her view of her life was distorted, and her tale spun of a material the underlying basis of which was the predilection for situations of suffering. The question suggested itself: If she could invent phantasies in which she suffered, why could she not have invented real situations in her home in which she could suffer? When the events of her life were retraced in this more critical light, an entirely different story was apparent. The patient's trouble was not alone the tremor of her hands, but what perhaps was more important, her distorted view of life. It was necessary to correct the latter, to make her view critically her inadequate reactions to certain situations of early childhood and adolescence, and not until that was accomplished did she gain sufficient insight into the motives in the productions of her symptoms and their final abandonment. Because the beginning of the tremor had coincided with an intolerable situation at home where she was supposedly abused, it did not necessarily follow that the alleged abuse caused the tremor. Instead there was a common basis in the patient's unconscious for the alleged abuse (which was not a cause but a symptom of the neurosis) and the resulting tremor. The forces at work were an accentuation of the sadomasochistic component with a masturbation and a prostitution conflict. The analysis indicated the manner in which these forces began to exert their pathologic effect. The patient was handicapped early in life by being crippled. Since her father had emigrated to America she had had a "thousand fathers and a thousand mothers," relatives and village neighbors, and received more than her share of pity. Circumstances prevented her mother and father from giving her the normal amount of love. The love she received was from strangers who pitied her, and she sensed early that it was her suffering which made them do it. This started her "career" of suffering. Finally a number of events precipitated the tremor. At 11 years she began to menstruate and had masturbatory experiences. About that time also her infant sister consumed all the attention of her parents. Jealousy was aroused and the "accidental" fall of her sister followed. The tremor developed the next day. The function of the tremor, therefore, was to prevent her from doing things which she unconsciously desired. In dreams, her hands always performed the same function of protection.

As the patient gained insight into her unconscious motives, the tremor gradually began to disappear until she was able to manicure her nails and thread a needle. Conditions at home she said were becoming much more pleasant. She realized that it was she who had changed and not her environment. For the first time in years she was on speaking terms with her father.

DISCUSSION

Dr. L. Casamajor reported that at the Vanderbilt clinic the case was considered one of mal development of the central nervous system. The choreo-

athetotic movements led to the belief in an organic cause for the condition. The patient's violent fright reaction to the tuning fork gave the first suspicion of hysteria. Only after the analysis did the tremor disappear. When the patient was last seen, the organic features, foot deformity, etc., still remained, but the psychic features had disappeared. The patient was extremely short in stature, and this with the organic handicap gave a basis for psychic compensation. After the removal of the neurotic elements, the primary organic disorders still remained.

Dr. Stern said that analysts could realize the great difficulty in putting into a short paper, the many months' work which the analysis of a case entails. He also said that the period of thirty-eight hours, which was the time given to the patient by Dr. Lehrman, was a remarkably short period of time for such good results. Another interesting feature was the association of a functional with an organic condition, necessitating careful weighing of the symptoms present; in this connection it may be mentioned that the organic condition is not necessarily a causative factor, for similar psychic states exist in patients not so handicapped. The important factor is the psychic make-up of the person and his way of reacting to certain situations. Dr. Lehrman's paper also gives us a glimpse into the causes of human behavior, indicating, at least in neurotics, behavior in adult life having factors that should be traced back to infancy for proper understanding of that person's adult behavior.

Dr. John T. MacCurdy said that Dr. Lehrman deserved hearty congratulation for the success of his analysis. Those who have ever attempted psychanalytic work in dispensary practice are well aware of the extreme difficulties attending this procedure. Dr. Lehrman's paper was further interesting in that it presented the problem of diagnosis in cases in which both organic and functional symptoms existed. Dr. MacCurdy wished to express his opinion that such diagnoses are much more easily made if the view is held that functional symptoms are the product of definite etiologic factors, just as are symptoms with an organic basis. In other words, a diagnosis of psychoneurosis should be made when a faulty make-up is demonstrable and the precipitating cause determined, which is of a kind that precipitates neurotic reactions. Without such data the condition is probably purely organic, but if these factors are present, the condition is either purely functional or has a large functional element. In this connection Dr. MacCurdy mentioned a survey that had recently been made of 100 consecutive admissions to the Medical Dispensary at Cornell. Each patient was first questioned by a psychopathologist who made a diagnosis of the organic or functional condition on the basis of the mental attitude and history of the patient. This meant a positive diagnosis of functional disease and a diagnosis of organic disease by exclusion. Each patient was then examined thoroughly by internists who made organic diagnoses on a positive basis and functional diagnoses by exclusion. In correlating the results there was a difference of opinion in only six cases, and 42 per cent. of the cases were found to be purely functional. Dr. MacCurdy expressed the opinion that an adoption of the method of positive diagnosis of the functional condition, rather than diagnosis by exclusion, would greatly increase the accuracy of our diagnoses in general practice.

PROGRAM FOR THE STUDY OF HUMAN BEHAVIOR. Dr. Stewart Paton.

Dr. Paton of Princeton University (by invitation) outlined his program of action for treating some of the human problems of the day. A more prominent part must be taken by the medical man in public affairs now, and a

definite program is still lacking. The great human problem in the world at present is that of human behavior. Dr. Paton's program would include a study of this. During the war psychiatrists were asked to help the government determine the predisposition of drafted persons, both in army and air service, for warfare. Those whose systems would probably crack during the strain were weeded out and not sent for overseas duty. The leaders of men could be recognized and used where they would be most efficient. There is just as great a field for neurologists and psychiatrists to pass on the predisposition of persons to be leaders. If it is believed that leaders already in power are not effective, an effort should be made to educate the public to this point of view. Moreover, the selection of trained men for industry, for negotiating labor problems, is an all important question. Labor problems often owe their existence only to the predisposition of the opponents and their consequent misunderstanding. In the present crisis abroad, only the arguments in favor of peace are considered while the predispositions favorable for peace are not taken into account. The wishful thinker, superidealist, is doing a great deal of harm in the world today, and is allowed to act without restraint. It is time for the world to emphasize the importance of the study of the human personality. Public men must be imbued with this idea. The financial end of establishing departments for the study of human behavior in medical schools is a stumbling block; yet other departmnets in universities receive endowments and special research funds. The astronomers have formulated their problems and are able to show what they want and need. The business man appreciates definiteness in detail, and his money and interests go to further work in which the end is known. The tendency of the program for the study of man is to overemphasize the importance of the analytic side, that is, the study of different organs and parts of the machine. A synthetical side, the study of the reaction of the individual as a whole, has been neglected, and this should be developed.

A pure research center for psychiatry situated in New York is urgently needed. New York should have the greatest center of this kind in the world since she has the greatest need for it. Provision should be made in this research center for training neurologists and psychiatrists, as well as those interested in educational, social and ethical problems. Here human behavior could be observed and checked up by clinical study. It is not necessary, however, to wait for the research clinic. The practitioner interested in the analytic side of his work should widen his interest so as to include the synthetic side and observe his patients as living beings adjusting to meet actual situations in daily life. This kind of study can be carried on to great advantage in general medical dispensaries. The opportunities for psychiatrists here would be limitless, but the difficulty will always be, until special training centers are founded, to get men properly equipped to fill the positions.

A new and untouched field for the study of human behavior is opening up in the university in which there is no medical school. The average college student is trying to find himself emotionally and mentally. A sizing up process is constantly active—problems of the individual in relation to religion, sex, attitude toward the world and the world's attitude toward him. Several types of students may be readily picked out: the so-called normal student, who makes an easy adjustment; the inadequate student, who assumes an imaginary importance to the university, based on his record in sports or studies. This type never comes quite up to the mark in spite of swagger and bluff, and is constantly trying to adjust himself. Some of these students pass through the

university and others drop out. Then there is the "sorehead" who, because of his failure to adjust himself, feels that he is singled out for special injustice. This injured, defensive attitude in such individuals unfortunately lasts through most of their lives. The attempt to correct these defects should be made before the university period, in early school days. Another interesting type is that of the boy with the original mind. This type, as a rule, is not fully appreciated. His intelligent curiosity and genuine interest in life does not lead him to books, nor does it develop the qualities necessary for passing academic tests. Gradually his inquisitiveness is killed, and he becomes intellectually indifferent. He has little chance of passing through the university, if he refuses to conform to convention. A great deal can be done for this type, and should be done. The world should be educated to the point of giving such a boy a better chance to develop his natural endowment.

DISCUSSION

Dr. E. J. Kempf said that he believed in the material presented by Dr. Paton. He was particularly interested in the psychopathic person in high school, in college and in business. Study of such characters will have to be carried on on an individual basis. The student of normal and abnormal behavior must try to analyze his subject's difficulties and help to synthesize a career for him which would gratify his unconscious, as well as conscious, cravings. The choice of a profession in business men is motivated by unconscious repressed wishes; these design his friendships, his enmities, his failures for him. His whole business life consists in an effort to work out his unconscious cravings, and he tends to remain blind to his own defects. Here is an enormous field for study and interpretation.

Dr. Gregory Stragnell (by invitation) expressed his interest in the presentation. The approach to these problems by the educator is unlimited when he understands what he can do. He has the opportunity of taking up the problems where the parents have failed. Education, even in the primary classes, should encourage the child to give expression to his personality instead of putting him through a machine-like process. A training institution would have scope for work at both ends, and educate the educator as well as the child. So many of the youths in Dr. Paton's third class fail simply because the educator feels that he must keep down to certain levels, where he can retain his dependence on books.

Dr. L. Pierce Clark said that the question of predisposition for business success or any form of success is one of development of mind and character. With some it is a natural gift. Personality has much to do with it. The fundamental thing for the present seems to be the restatement of the development of the successful life which may be presented to adolescents.

Dr. I. Strauss said that any hope of reaching a solution is lost if we have to define a successful life. It is nothing new to hear a professor say that the college does not educate. The problem in Dr. Strauss' opinion must first be attacked analytically. It is too early to make the synthetic attack. When education is to be attacked we must begin with the parents.

The exceptional boy has no outlet, and the educator could not make an adjustment for this individual. Something might be achieved if these types could be segregated and specially instructed. The seal of approval, however, is the desired goal of most men. One good move has been made by the founding of a clinic in which the exceptional boy can be studied and analyzed, and a prescription for future conduct issued. This process is, however, a very expensive one.

Where are men to be educated? As soon as research work shows the need of such special training the work will begin. The medical school does not pay enough attention to behavior, it is true. The successful practitioner is the man who by reason of his personality can handle human beings as such. The medical schools should aim at this individualistic concept. Courses on human behavior which might be developed would not find acceptance in the medical schools, since the need has not yet become apparent, and there is no interest outside of actual technic. The tendency has been for the medical profession to shut itself off and remain quiescent on a high pinnacle. Until we can come down to the level of the rest of the community, nothing can be done. The same apathy has been striking whenever questions of public cooperation have been raised, the Workmen's Compensation Act for instance. Advances have already been made in the study of the personality in connection with employment in business, but the medical profession is doing nothing to direct this work. First must come research, then propaganda, then after showing the need for this type of work, we can begin to plan a program.

Dr. B. Rosenbluth told of his experience with people, mostly of the working class, whom he has given the facility to come in to see him at stated intervals. The people's great want, experience with this class shows, is the desire for discussion of their problems so that they can make their own conclusions from the premises of the discussion. The sense of loneliness of the individual is the most striking feature. This results from the necessity of each person working for self. The army experience is valuable because self is eliminated, and the value of the individual is estimated for communal good; that is, a man must be a factor in relationship to the safety and efficiency of the whole unit, and not in relation to himself. This experience should be applied to civil life, and the individual should be taught that existence is not for self only but in relationship to others.

The strength of the individual is strength only as far as it is the strength of the social unit to which he belongs. Hence education should be directed to adjust the individual automatically to those about him, and not merely to adjust himself into some part of the community in which he finds himself comfortable.

The failure and "sorehead" is the person who sees only himself, and feels that nobody can appreciate the qualities which he knows he has.

Dr. Foster Kennedy pointed out that the Roman Catholic church asked for the education of the child up to the age of 7 years, realizing the importance of the early education. Physicians as a rule do not read enough history. If they did, they would notice that those nations in the past have stood highest in which potestas patris was strongest. With the decline of control in the family, the nation as a whole declines. Rome, China and the Jewish race show this. The maintenance of the family unit is the integral factor in the maintenance of the herd. The exceptional boy will take care of himself eventually, but it is the mass that must be educated. The problem of education will be greatly simplified when children are reared properly in the nursery.

Dr. Paton, in closing, said that he believed there were reasons justifying optimism in regard to carrying out the program. The deans of colleges were anxious to cooperate and were greatly interested. If the medical profession could supply the men—those who understood and could interpret human behavior—the services of these experts would be sought. The recognition of the need for men trained in the subject of human behavior was developing faster than the supply of experts. The fate of democracy depends on the measures taken to supply the demand.

Book Review

PSYCHOPATHOLOGY. By Edward J. Kempf, M.D., Clinical Psychiatrist to St. Elizabeth's Hospital (Formerly Government Hospital for the Insane), Washington, D. C.; Author of "The Autonomic Functions and the Personality." Pp. 762. St. Louis: The C. V. Mosby Company. Copyright, 1920.

In his first book, "The Autonomic Functions and the Personality," Kempf evidenced his rich psychobiologic imagination, which made us await with keen interest the present work. It promised to bring concrete material in which the concepton of special autonomic strivings and their conflicts could be studied. Perhaps the most insistent and consistent of our younger American psychopathologists, a man with a theory and a tremendous determination to push it to its logical and practical end, Kempf has indeed brought himself to a fuller expression than any present-day worker in this field.

With this volume Kempf has earned the credit of giving the first consistent account of a wide range of mental disorders viewed from the angle of sex-pathology and the struggle for what he formulates as virility, goodness and happiness. Ninety-three well-written case reports form a highly commendable record of less than a decade of well focused work at the Indiana State Hospital at Indianapolis, the Henry Phipps Clinic and the Government Hospital of Washington, D. C. Viewed from this angle, the material offered is, to the reviewer's knowledge, the most noteworthy product from any single worker and, he does not hesitate to say, from any aggregate of workers. It is a unique record—and would be unqualifiedly the most remarkable production of our period if it showed evidence of a safer scientific basis.

The series consists of three "anxiety neuroses," seven "psychoneuroses" (hysteria and compulsion states), thirteen "manic-depressives," five "paranoics," thirty-six cases of paranoid dissociations, nine cases of catatonic dissociations, seventeen cases of hebephrenic dissociations, two cases of general paresis, and one of arteriosclerotic deterioration.

These cases are discussed under these interesting headings: Suppression or Anxiety Neuroses (pages 201-288); Repression or Psychoneuroses, their mechanisms and relation to psychoses due to repressed autonomic cravings (pages 289-252); Benign Compensation or Regression Neuroses, with or without dissociation of personality, manic-depressive psychoses, elimination or simulation of wish-fulfilment in affective crises (manic-depressive psychoses, pages 353-420); Pernicious Repressive Compensative Neuroses, the psychopathology of paranoia (pages 421-476); the specially important Chapter X, the psychopathology of the acute homosexual panic, acute pernicious dissociation neuroses (pages 477-515); the psychopathology of chronic pernicious dissociation of the personality, with defensive hatred, eccentric paranoid compensations and pernicious deterioration (chronic paranoid dissociation, pages 516-555); the psychopathology of chronic pernicious dissociation of the personality, with crucifixion and catatonic adaptations to the repressed cravings (chronic catatonic dissociation, pages 556-614); and the psychopathology of chronic perni-

cious dissociation of the personality, with hebephrenic adaptations; predominance of excretory erotic interests (chronic hebephrenic dissociation, pages 615-697).

The setting is furnished by the following chapters:

Introduction (pages 1-19); physiological foundations of personality (pages 20-75—in many ways a restatement of the essence of his first book); the psychology of the family (pages 76-117); the universal struggle for virility, goodness and happiness (pages 118-178); the influence of organic and functional infirmities on the personality (pages 179-188); and the mechanistic classification of neuroses and psychoses produced by distortion of autonomic affective functions (pages 189-200). The casuistic chapters are followed by: A reconsideration of the conditioned and repressed autonomic affective determinants of abnormal behavior (pages 698-732), and a brief chapter on "psychotherapeutic principles" (pages 733-751). Two pages of bibliography and an index close the book.

The whole presents a rather formidable task for the reader and reviewer, but one which is likely to hold the attention, especially in the concrete material.

An attempt to restate the work at once confronts one with the intensely personal spirit of the whole book. Kempf is a man of one dominant idea and principle, that of the "autonomic strivings" for gratification of the sex instinct and of the struggle for success in winning both the goal and the esteem of the object of adoration. The collection of case records which he presents as a basis for his "Psychopathology" and discussion of principles is a remarkable display of ever recurrent motives and problems of this type, each record well presented and clearly focused, although obviously with a preeminently sex-dynamic vision, comparable to a study of the visual world made only with ultra-violet rays. In this and in the plastic and directly and frankly demonstrative method of illustrating his ideas with no less than fifty illustrations from pictures and statues of ancient and modern art, in addition to pictures of, and by, patients, Kempf has furnished the bald explanation of a great deal that was left in uncertain outlines in his previous book.

It may be most advantageous, after the summary survey, to begin with Kempf's series of case records, to review them for the facts and suggestions they offer, and then to review the theoretical deductions.

A number of cases can be grasped simply and directly in terms of any kind of pragmatic psychology, irrespective of the proposed theories.

In many of the case records, Kempf leads one to assume a positive "segmental autonomic striving," wherever any symptoms occur that would refer to the anal, oral, balanic or vaginal zone; any fancy or hallucination, whether with the positive, aggressive or defensive sign, must denote this "autonomic striving." In order to keep up the tremendous pressure under which his formulas must hold and work, he is as unable to tolerate a middle ground as is Freud with his obligatory psychodynamic determination of *all* the memory lapses and the like. The idea that some of the reaction-tendencies *might* be swung in incidentally and be dangerous only because of the biologic ease with which they can *become* dominant, would probably be intolerable to him. It would take away the obligatory validity of his neurophysiologizing scheme, which, we think, can figure only as a subsidiary hypothesis. One could be much more sympathetic toward a conception which would speak of *relatively "autonomous"* (not purely "autonomatic") reaction-tendencies, more or less characteristic of the eccentrically reacting individual or family, or charac-

teristic of the type of break of compensation. But this would render negative the chosen scheme which makes of the living being a series of segmental autonomic organs of appetites, sticking out sensory surfaces so as to be sure to catch all the contacts and agreeable tickles needed for the gratification and neutralization of the cravings and incidentally the satisfaction of the biologic needs.

In this continual reference to the autonomic segment and striving, undoubtedly one is better guided to something more concrete and biologically helpful than with old-fashioned nerve-cell talk. But why replace it by an autistic nerve-physiology? The facts could be just as adequately and correctly expressed in common-sense psychobiologic terms and situations, unless we should really be able to single out specific neurophysiologic patterns accessible in neurophysiologic terms and experiments, working and workable in a simple physiologic manner.

Kempf yields to the ingrained psychiatric obsession to offer a *"classification of neuroses and psychoses."* It is a "mechanistic" *classification,* in contrast to a nosologic one, but also in contrast to the freer and more plastic dynamic *formulations.* It is mechanistic in showing how a "distortion of autonomic-affective functions" produces definite types of "neuroses" (and psychoses) characterized according to the "mechanism" as suppression-neuroses, repression-neuroses, compensation-neuroses, regression-neuroses, and dissociation-neuroses. He specifies in his table (reproduced in the *Journal of Nervous and Mental Diseases* **50**:105 (Aug.) 1919, and in Jelliffe and White's "Nervous and Mental Diseases," Edition 3, p. 784): the diagnostic classification; the grouping as benign and pernicious; the mechanistic differences of the five types mentioned in the foregoing; the common symptoms; the common causes and the old diagnostic terms. *Suppression neuroses* go with clear to vague consciousness of the nature and effect of the ungratifiable affective cravings; *repression neuroses* with "vague consciousness to total unconsciousness of the nature and influence of the ungratifiable affective cravings"; *compensation neuroses* with "persistent striving to develop potent functions and win social esteem initiated by fear of impotence or loss of control of asocial cravings"; *regression neuroses* with "failure to compensate but regression to a preceding more comfortable, irresponsible level, permitting wish-fulfilling fancies, postures and indulgences"; and *dissociation neuroses* with "domination of the personality by the uncontrollable cravings despite the efforts of the ego to prevent it." The enumeration of the "common symptoms" shows the difficulty of carrying through these differentiations which are by no means always exclusive of each other and therefore should figure as *principles* to be considered in the free formulations of the cases rather than as a "classification" of the "neuroses" and psychoses, and much less as a classification of *case,* a hankering excusable in a naive statistician but not in a modern clinician. Kempf gives the double-edged advice: "We must not forget that the golden rule in diagnosis is to know what we are looking for because then it is infinitely easier to find it" (in italics). He bows to the traditional use of the descriptive terms "acute" (of less) and chronic (of more than a year's duration) and periodic (for periodic, intermittent or recurrent). The "autonomic-affective conflict" is benign or pernicious according to whether the ego can accept it or not and when it is of a postadolecsent or infantile type. Cases can change their classifications; a pernicious typical "paranoid dementia praecox," on the development of a transference to Kempf, could be brought back to a simple benign suppression-neurosis.

One serious drawback in this scheme is the difficulty of obtaining a generally acceptable and fixed meaning of the terms used. Rivers uses exactly the opposite meaning in the terms repression and suppression; the term dissociation is generally used for a broader conception than Kempf's, including the benign as well as the pernicious dissociations; moreover, in actual work one finds that the various "mechanisms" can coexist and do not exclude each other and have by no means always the same benign or pernicious meaning.

A psychophobia unnecessary in this age of explicit or tacit acceptance of the concept of psychobiologic integration comes out in the paragraph on page 199: "In conclusion, the term 'psychosis' is not used because, after all, the sensory phenomena which we are conscious of as thoughts and wishes are really integrative physiological processes and the term 'neurosis' is more consistent with the integrative functions of the nervous system." Kempf has not got beyond the physiologizing integrative functions of the nervous system, and yet he works altogether with integrations only fully intelligible in psychobiologic terms. The positive side of the scheme is nevertheless of great stimulating and clarifying value, if given as a scheme to give *a dynamic formulation of the facts in a patient*, and it can properly be carried out even when one has cause for doubt concerning the exclusively autonomic character of the affective and other dynamic factors.

When one goes through the cases one certainly meets a wide range of facts which are practically all expressed in terms of psychobiologic and psychodynamic factors and reactions commonly accepted and understood, and relatively few which could be said to be demonstrable as of intrinsically and purely autonomic origin. The case records have their force in the psychodynamic approach and much less clearly in any demonstrated merit of the theory. One is continually reminded of a kind of contrast of the "ego" as the supposedly good or at least acceptable element, and the autonomic craving as the "flesh" of a not especially biologic type of ethics—no doubt a simple and practical scheme but one playing into the hands of those who may be too quickly and too dogmatically influenced when their turn will come to hold a fixed scheme over the patients and over the world. Kempf's own moral philosophy seems to be sufficiently fluid to satisfy even the most radical yearnings for sex-emancipation; but the revulsion which may come when the present generation assumes authority over the next generation may make one yearn for a less cut and dried scheme than that of the conflict of ego and flesh.

For a quick review of the conception of man and human problems as Kempf sees them, a study of the illustrations and their legends furnishes a vivid summary such as, to the reviewer's knowledge, no other author has given us. We find there the serpent and phallus and the bowl and the vase, the signs of union, the incest problem, the popularizing and refining of sexual interests, "insuring the race against autoeroticism, prudishness, prostitution, perverseness and suicide;" the anguish and regret at sexual waste, the agony of uncontrollable, ungratifiable sexual cravings, contrasted with the picture of "contentment of a normal biological career," the association of nutritional and sexual interests; the struggle against homosexuality, the regression of masculine virility to effeminacy after slaying a friend; the eternal vigor and constructive power of uncensured heterosexual love; the agony of woman's mission of maintaining the earth and fruits thereof; the vase of the caryatid as the burdensome uterus and longing for maternity; the storm "a love fantasy pursued by censorship;" the ring "an uncensured love fantasy;" the Madonna of the Rose, with traces of longing in the features and a costume indicating a highly sublimated attach-

ment to the father; the mother and child worship; Bacchante, a modern version of joyous motherhood, freed from religious suppression and dogmatic conventions; the "requiem," and Boecklin's Toteninsel, depicting the affective significance of suicide as return to the uterus; Buddha the sublimation of autoerotic selfsufficiency; types of copulation, stimulation of reproduction; fancies of impregnation; Graziella planning to catch the lover with the net; longing for maternity; Eve in anguish following the censored sexual act, etc. Postures and productions of patients are further illustrated by archaeology and classical and modern art, to bring out the struggle against and flight from the autoerotic, the analerotic, oral-erotic and incestuous "segmental strivings." Stuck's sphinx (persistently called *der* sphinx) shows a young man destroyed by the selfish, bestial, incestuous love of the mother. In short, Kempf gives a remarkable array of pictures with many ingenious interpretations partly suggested by patients and a very clear and helpful illustration of the author's vision of art and artistic imagination.

The same sagacity and directness hold in Kempf's reading of the problems of the family and the history and fate of various combinations of temperaments. The willingness to state as definite generalizations many a fact derived from the histories of cases goes with the keenness of Kempf's capacity to use all experience in concrete problems of family and human relationships as part of his psychiatric world of thought. It is this capacity to see and to use life that brings him close to what is meant by the "common-sense" which he belittles in others when applied to the problem of consciousness and the philosophical and logical foundations of psychopathology.

Kempf is one of those who found in Freud's hysteria studies and the concept of freudian analysis a tremendous help for liberating their own dramatization of human problems and those seen in patients and in art and in a general conception of human life. For any one who wishes for an epitome of Kempf's standpoint, nothing could be better than to read one of his earliest analyses (P. N. 1, page 293, also published in the *Journal of Abnormal Psychology*, [April, 1917]) and his review of the "Yellow Jacket" (*Psychoanalytic Review* **4**:393-423), unfortunately not taken into the book in toto, but, at least in the original, in the description of childhood and adolescence, the best thing Kempf has ever written.

Like Crile, a precursor of Kempf in the appreciation of emotions in medicine, Kempf seems to have found in Darwin his somewhat belated liberator from a dogmatic bringing up. The unrelenting "struggle for survival," the power of the emotions and the compelling rôle of limited visceral mechanisms in the activation of the emotions have led Kempf to the somewhat grotesque but nevertheless illuminating conception of the relation of autonomic and "projicient" mechanism of man. Freud's panerotization of dynamic psychology and Sherrington's concept of a final common path and postural tensions, are combined with Kempf's own tremendously keen desire to shape life and to give it a fervor and artistic fulfillment and conquest in the struggle for esteem. A need of feeling and of expressing his vision of human nature and human facts in terms of emotional superlatives is illustrated in his style and choice of terminology. With it goes also a staunch resistance to anything that would moderate the contrasts with which the picture as he sees it could alone be staged to full advantage. Fervor, strenuosity and an attitude of the bitter-ender mark the method and the result; and the unwillingness or inability of reintegrating the psychology as taught him by his early training is the main limitation of the scheme and the cause for far-reaching overcompensations.

Kempf has to speak and think in terms which represent situations of great affective meaning to him. He sees and uses analogies which the average physician would hardly be tempted to apply. Passivity becomes crucifixion, restraint castration, etc.

With the emotional appeal, there goes, however, a decided lack of concern about the scientific and critical solidity of the speculative ground on which he chooses to build. On a more modest basis his formulation of man as a self-constructive and to some extent self-steering product of integration would be acceptable and will coincide with other concepts of integration. But on the one hand he falls short of it, and on the other he makes assumptions which few serious workers would be willing to endorse; and the whole becomes a narrowing scheme, fortunately richly compensated for by a wealth of data of observation and conjecture which makes one condone the relatively extraneous theoretical claims.

Kempf overcorrects the intellectualizing tendency of tradition by creating a supremacy of autonomic segments and their strivings, segments which "create" and maintain the "projicient mechanisms," i. e., the central nervous system and the somatic as opposed to the visceral body.

Kempf is so fascinated by his formulation of the autonomic segments and the procurer's rôle of the projicient nervous system that the adverse results of Cobb's experiments (*American Journal of Physiology* **46**:478) could not affect his scheme. Sherrington's experiment on the emotions is not mentioned, whereas it might well be remembered as a balance to the too one-sidedly exploited studies about the final common path and the postural tensions. One is reminded of Robinson's continual pleas for the "abdominal brain" and of Pfaff's criticism of the oral digestion theory of Fletcher, which he doubted because if Fletcher were right, the vertebrate would probably have a mouth several feet long and a much shorter intestinal tract.

Just as the old phylogenetic recapitulation theory so long exploited by Stanley Hall, Kempf's combination of freudian technic, Thomistic philosophy and Sherrington's integrative functions of the nervous system yielding the contrast of the autonomic and projicient nervous system will help some students on a biologizing basis who might not be reached by a more matter-of-fact and critical dynamic psychobiology.

The "law of compulsion by the segment" (in states of hunger, fear, hate, love, shame, jealousy, sorrow, eroticism, etc.) to seek counter-stimulation and neutralization of its craving seems to Kempf to be "the physiology of the wish and the fundamental dynamic principle of all behavior; and not until this law and its physiology are understood and applied can normal or abnormal behavior be really understood." But why note only the segmental share in these reactions? The poor segment may suffer new therapeutic onslaughts if the doctrine is taken seriously. "Why not trim the *organ*" if its strivings are the sole or at least essential source of the tribulations of the ego? Many a surgical conscience over clitoridectomies, ovariotomies, etc., might be relieved, if the view could be proved.

The keen feeling with which Kempf, in his introduction, considered the suggestion of "neurologizing tautologies" as a nonrecognition of the intrinsic material so ably presented by him, prompts one to examine the cases in order to find whether it is life-situations and reactions described in terms of topical and diffusely emotional experiences that exhaust the description or whether there really is an appeal to *neurology* in the concrete cases. If neurologic data

exhaust any set of facts, we should accept Kempf's neurologizing—his speaking of neuroses and his emphasis on the autonomic segment—i. e., if the facts really warrant expression in neurologic rather than psychobiologic terms. As things stand, it would seem wiser to accept the facts as a psychobiologic domain, without assuming that it must first be translated into a would-be scientific theory to be scientific.

The "scientific" foundation is made up of borrowed capital, from domains in which Kempf has neither practical nor research experience nor strictly controlled training. It will not do to pass by Sherrington's views on emotions, expressed in his book (pp. 255-268), based on the fact that a dog in which appropriate spinal and vagal transsections removed completely the sensation of the viscera and of all the skin and muscles behind the shoulder showed *no* obvious diminution of her emotional character: "Her anger, her joy, her disgust, and when provocation arose, her fear, remained as evident as ever," etc.; only the bristling of the coat along the back no longer occurred, while the dilatation of the pupil in anger persisted. "In view of these observations, the vasomotor theory of the production of emotion becomes, I think, untenable, also that visceral sensations or presentations are *necessary* to emotion," etc. Goltz's dog deprived of hemispheres shows that Kempf's "projicient" nervous system contains fundamental hereditarily acquired provisions, elimination of which destroyed all evidence of joy or pleasure or sex-emotions, while anger and displeasure, more definitely dependent on pain stimuli, remain at least enacted in a machine-like reflex-fashion. Hence the "autonomic segmental" function is contributory to primitive emotion, but reinforcing rather than initiating the "psychosis," after it has once been established.

It would be ungracious to take up one by one the claims of the chapter on the "physiological foundations of the personality." Many of the discussions are stimulating. But, as in so much of our pioneer work, "science" has to furnish a cloak of wholly unnecessary "authority." Let us hope that the challenge of the scientific conscience by this otherwise so meritorious work will lead to critical investigation—much as we would prefer that science might have a chance to work positively and constructively rather than be spurred on by the need of self-defense.

The formula by which Kempf measures human life does not depend on the neurologizing. It is a frank modern expression of gratification of the primary and subsidiary wishes as opposed by environmental resistance in the form of the wishes and prejudices of other people (father, mother, sister, brother, wife, husband, children, friend, priest, employer, etc.) as well as the material which wish has to work with—vocation, "disinterested" (i. e., uninterested) husband, etc. From the actual behavior (productions, many fancies, vocational pursuits, hobbies, religious and social affiliations, economic resources, addictions, hallucinations, delusions, dreams, methods of obtaining comfort, associates, etc.) and the resistance, we can disclose "what the wish or affective craving is that compels the pathological adjustment." Similarly, given the wish and the behavior, we can infer the nature of the resistance—as in the amorous wife who hallucinates sexual gratification, we "know" that the husband is indifferent, or more usually, heterosexually impotent. When the wish is ascertained and the patient recognizes and admits it as a part of his personality, the psychosis changes proportionately into an anxiety neurosis, the dissociation of the affective forces disappears through accepting the socially inferior cravings as a part of the personality (Case P. D., p. 33). The analysis

leads regressively from the conditioning of one wish to the influence of an earlier wish, and back to the adolescent and preadolescent wishes, the influence of the family, etc.

The whole scheme is an excessively determined disavowal of hereditary disposition and of *native* disproportions of individual make-up and resultant conflict. The first occasion for a discrepancy to show becomes the "cause" of the discrepancy; and the parent is emphatically judged in terms of life and conduct and its influence on the growing child and not in terms of any irresponsible germ-plasm. It certainly is a good thing to keep these concepts fluid; but there is no reason why one should go from one extreme to the other. It is a good thing to realize that the parents who want to own their children body and soul have, to say the least, not a modern philosophy; it may even cause much well-deserved heartburn to recognize the devastating influence of marital disharmony and too little and too much love and the base motives in much of the love. It might, however, make some innocent parents turn in their graves and some live ones go into depression, while, no doubt, *some* more healthy-minded ones may well incorporate some modern ideas into the code of life of the present day and of the future generations. The picture of direct retribution of fate is dramatically formulated in the legend to Michael Angelo's Pietà:

"The loving son of the too-devoted mother becomes the instinctive rival of the father. If he is unjust to wife and son, the son develops parricidal impulses. If he is unjust to the son and the mother is loyal to her husband, the son tends to become a wandering hero (hobo). If he is dominated by a severe, just father and pitied by a timid mother, he becomes crucified and sacrifices himself to his father's glory and potency. He often 'dies,' descends into the hell of invalidism and infantism, and is nursed and petted by the mother. Often before the sacrificial regression, he seeks a mother substitute in Magdalen, the prostitute, who having a reciprocal father attachment sympathizes with him and often marries him."

In order to make this improved moralizing and casuistry acceptable, Kempf has found himself conditioned to invent his "scientific" background. We trust that the psychobiologic formulation will be able to do justice to all the facts of experience without doing violence to both neurology and psychology. It is not the theory but the admirable vital and dynamic frankness of the author's own experience and fervor that make Kempf's book a contribution which deserves frank admiration and careful study by the student, *provided that the student knows how to preserve his or her own balance of observation through work with actual patients.* He certainly has the courage of talking the language of life. As a text or as a guide professedly written "for the professional student of human behavior who must have an unprejudiced insight into human nature in order to deal justly and intelligently with problems of abnormal behavior as they are brought to the physician, rectory, police courts, prisons and asylums, and the directors of schools and colleges, and the commanders of military and naval organizations," it offers stimulation and a mass of liberating material, which, however, should be assimilated together with personal work done under competent supervision lest a doubtful perspective and personal interpretation by the untrained and unchecked beginner might discredit the good motives and intentions. In view of the highly debatable character of the pictorial policy of the book and of its theoretical claims, it is a pity that the author furnishes the material for the published advertisements

of the book to too wide a circle of prospective beneficiaries. The failure to divide it into a book for the student and into one for a wider public may carry its own antidote.

There are many features in Kempf's presentation that go against one's judgment and against one's grain. Yet the frank and direct way, always headed for concrete situations and concrete reactions in principle at least, makes one return to the material, if it were only for the intensely dynamic point of view. Growing success and growing responsibilties will tone down many overarduous places. Whether the author will ever make any compromise with those whom he systematically shuts out from his consideration may well be doubtful, and it will not matter very much. Psychopathology is and will for some time be a rather individual affair. We have many individual brands—from Forel's hypnotism psychology, through Janet's dissociations, Sidis' hypnoidization and fear pathology, Prince's multiple personalities, Freud's elaborate analytic system, Jung's analytic constructive vision, the workers on symbolism, etc., the nosologists like Kraepelin, to the more pragmatic workers with the facts as we find them; and Kempf's may well be called the most concretely expressed of the more complex formulations and therefore very suggestive and stimulating. He is so intensely alive with what he sees and feels and works with that we may well wish him a rich experience with which to supplement what we still feel most lacking in his analysis of the "Yellow-Jacket" and throughout his discussions: a more restful view of possibilities for a species which does not have to *produce* the projicient nervous system, but receive it largely preformed and available for an existence in which the autonomic strivings have a more incidental rather than superbly dominating place. The fervent adolescent and early adult period with the sign of strife and struggle and resentment of compulsion and its desire to use compulsion, is a stage much less turbulent in most persons, psychopaths included, and the curative work can operate with a philosophy of greater stability to greater advantage than one would infer from the intensely aggressive temper of the accounts. Perhaps we are not so far from the time when men of the most different temperaments can receive and accept training in all the fundamental lines of neuropsychiatry without any morbid fear of being stunted or without having to go too exclusively their own way? For any such product of the future, Kempf can be sure to be one of the valuable contributors and sources of stimulation with facts and contrasts.

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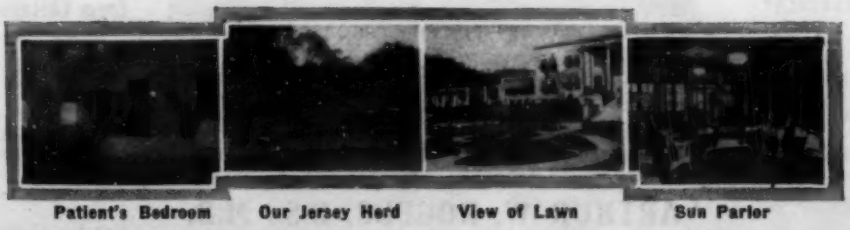

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